

FLORA OF PANAMA

BY
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AND
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PART V

Fascicle 2

RESEDACEAE
MORINGACEAE
CRASSULACEAE
PODOSTEMONACEAE (Van Royen)
SAXIFRAGACEAE (McClintock)
CUNONIACEAE
ROSACEAE (McVaugh, *Rubus*, by L. H. Bailey)
CONNARACEAE
LEGUMINOSAE, in part

ANNALS
OF THE
MISSOURI BOTANICAL GARDEN

AD 1840 AD 1840

FLORA OF PANAMA

Part V. Fascicle 2

RESEDACEAE

A small family of annual or perennial herbs with alternate or fasciculate leaves and spicate racemes of small, asymmetrical flowers with white or yellowish, cleft petals. No genera or species are indigenous to the New World, most of them being native to the Mediterranean area. The genus *Reseda* ("mignonette", *reseda*) has been introduced into Panama and is cultivated in gardens in the Boquete region.

MORINGACEAE

This family, consisting of a single genus and very few species, is represented in Panama by *Moringa oleifera* Lam., which has been introduced into cultivation from the Old World tropics. The plants are shrubs or small trees with brittle, rather resinous or gummy branches, and whitish bark. The leaves are large, alternate, and twice or thrice pinnate. The inflorescence is panicle and axillary with rather mediocre but fragrant, white or reddish flowers. The fruit is a rather large and elongate, 3-angled capsule dehiscent by three valves; the seeds are 3-winged and oily.

The vernacular name of *M. oleifera* is "horseradish tree" or *marango*, a name arising from the flavor and odor of the roots. The oil from the seeds is comestible or may be used as a substitute for ben oil which is produced as a lubricant for watches and other delicate mechanisms from a related species, *M. aptera*.

CRASSULACEAE

Usually fleshy or succulent herbs or subshrubs, with thick stems and alternate (infrequently opposite), many-ranked leaves. Leaves usually thick and fleshy, mostly simple and entire or crenulate, infrequently pinnately compound, in many species living for a considerable time after being removed from the plant and in some cases capable of producing plantlets from the marginal indentations. Inflorescence frequently cymose, less often racemose or panicle. Flowers typically coarse and stiff, perfect, regular, polypetalous or sympetalous; calyx 4- to 5-parted, the sepals free or united; petals 4-5, free or united, mostly persistent; stamens in 1 or 2 cycles, each cycle isomerous with the petals; carpels as many as the petals or sepals, essentially free or united at the base, the ovules usually numerous from a ventral placenta; receptacle normally with a scale opposite each carpel. Fruit follicular from the individual carpels; seeds small, punctulate.

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(121)

A family represented in almost all parts of the world, especially in Africa; best represented in warmer latitudes, not uncommonly under subalpine conditions. A. Berger (in Engl. & Prantl, Nat. Pflanzenfam. 18a:352-483. 1930) probably has given the most acceptable recent treatment of the family.

- a. Tall herbs; leaves opposite, petiolate, often pinnate; flowers 4-merous, the calyx tubular, inflated..... 1. BRYOPHYLLUM
 aa. Small herbs; leaves spiral, sessile, simple; flowers 5-merous, the sepals essentially free..... 2. ECHEVERIA

1. BRYOPHYLLUM Salisb.

BRYOPHYLLUM Salisb. Parad. Londin. pl. 3. 1805.

Physocalycium (?) Vest, in Flora, III, 2:409. 1820.

Crassouvia Commers. ex DC. Prodr. 3:395. 1828.

Kalanchoe R. Hamet, in Bull. Herb. Boiss. II, 7:870. 1907, in part.

Erect, succulent, perennial herbs or subshrubs, usually glabrous. Leaves mostly simple but sometimes pinnately compound, opposite, thick and fleshy. Inflorescence usually a terminal panicle. Flowers perfect, regular, usually nodding, mostly 4-merous; sepals 4; usually united into an inflated tube; petals 4, sympetalous, somewhat exceeding the calyx, usually constricted above the ovary, the lobes shorter than the tube; stamens inserted on the lower corolla tube, the filaments about equalling the corolla; carpels partly united or distinct; ovules numerous; disc bearing 4 glands or scales. Fruit normally of 4 follicles.

The genus is distinguished from the New World genera of the family in possessing the large, inflated calyx and opposite, sometimes compound leaves. It resembles the African and Asian genera *Kalanchoe* and *Kitchingia*, differing from these in the insertion of the stamens toward the base of the corolla tube in the large, nodding flowers. A single species is naturalized widely in Panama, but is not frequently collected.

1. BRYOPHYLLUM PINNATUM (Lam.) S. Kurz, in Jour. Asiatic Soc. Bengal 40²:52. 1871.

Cotyledon pinnata Lam. Encycl. Meth. 2:141. 1786.

Kalanchoe pinnata Pers. Syn. Pl. 1:446. 1805.

Bryophyllum calycinum Salisb. Parad. Londin. pl. 3. 1805.

Perennial, little-branched herb as much as 1 m. tall or taller, the stems fleshy, glabrous, lustrous, the roots diffuse. Leaves opposite, simple or less frequently 3- to 5-pinnate (usually both simple and pinnate leaves on the same plant), in compound leaves the terminal leaflet the largest; blade of leaf or leaflets oblong, rounded at base and apex; coarsely crenate, glabrous, as much as 13 cm. long and 7 cm. broad, fleshy and obscurely nerved, capable of producing plantlets from the indentations of the leaf margin; petiole conspicuous, commonly 3-4 cm. long on older leaves, fleshy, glabrous, widened toward the base, exstipulate but with decurrent interpetiolar lines on the subtending internode. Inflorescence a glabrous, terminal, thrice-compound panicle as much as 5 dm. long, the bracts and bractlets

minute and caducous. Flowers large and conspicuous, with pedicels mostly about 1 cm. long; calyx broadly tubular, inflated, usually about 3 cm. long and 1 cm. broad, 4-lobed for one-fourth or one-fifth its length, greenish often tinged reddish; corolla tubular, 4-5 cm. long, mostly enclosed by the calyx, markedly constricted just above the ovary and thence ventricose, 4-lobed, the lobes triangular and acuminate, glabrous, reddish; stamens 8, inserted at the base of the corolla tube, the filaments almost as long as the corolla.

Native of tropical Africa and Madagascar; introduced and naturalized in the tropics throughout the world.

CHIRIQUÍ: Boquete, Woodson & Schery 759.

The species is quite common in the American tropics, both as a cultivated plant and as an escape. The rather bizarre flowers are not unattractive and the peculiar ability to produce plantlets at the notches of the leaves enhances its interest, earning the popular names "life plant" and *boja del aire*. Standley reports (Fl. Panama Canal Zone, p. 187. 1928): "Among the West Indians of the zone [Canal Zone] a favorite method of testing the fidelity of a sweetheart is to place a leaf of this plant above one's door. If a new plant is produced at each notch, her faithfulness can not be questioned."

2. ECHEVERIA DC.

ECHEVERIA DC. Prodr. 3:401. 1828.

Caulescent or scarcely stemmed perennial herbs, the leaves frequently borne in a basal rosette, fleshy and succulent. Leaves spirally arranged, sessile, entire, usually glabrous and somewhat glaucous. Inflorescence usually a lax spike or raceme, the flowers arising singly or in pairs in the axils of the reduced stem-leaves. Flowers fleshy, variously colored; sepals 5, more or less free, equal or unequal, frequently erect, mostly greenish; petals 5, usually exceeding the sepals, free or somewhat united at the base, frequently erect and angled; stamens 10, the outer cycle mostly inserted at the base of the petals; carpels 5, united at the extreme base, tapered into slender styles. Fruit follicular.

An interesting and attractive genus much used for ornamentals because of the rosettes of thick, handsome foliage. Distinctive characters frequently are lost in making herbarium sheets of such succulents, which may account for the widespread confusion of species limits. Horticulturalists have been particularly concerned with the difficulty in naming specimens accurately, and such students of the group as Britton and Rose (N. Am. Fl. 22:13-26. 1905) and von Poellnitz (Fedde Rep. Spec. Nov. 39:193-270. 1936) apparently have overdone the splitting of species.

The genus occurs in the southern United States to middle South America, centering in Mexico. A single species is known to occur in Panama.

1. ECHEVERIA AUSTRALIS Rose, in Bull. N. Y. Bot. Gard. 3:6. 1903.

Caulescent, little-branched, succulent herb to a few decimeters tall, glabrous and more or less glaucous. Leaves sessile, obovate or spatulate, up to 7 cm. long

and almost 3 cm. broad in the larger, basal leaves, progressively smaller along the flowering stems, rounded or abruptly acute at the tip, broadly cuneate at the base, entire. Inflorescence terminal, appearing racemose by the insertion of flowers in the axils of reduced, frequently caducous leaves; pedicels 2-5 mm. long. Flowers moderate, pink; sepals 5, narrowly or broadly ovate, rather unequal, 5-10 mm. long; petals 5, lanceolate, about 1 cm. long, rather thick and rigid, mucronate-acute, essentially free; stamens 10, almost equalling the petals; filaments slender, glabrous; anthers oblong, about 1 mm. long.

Costa Rica and Panama.

CHIRIQÚ: Río Chiriquí Viejo valley, P. White 39.

PODOSTEMONACEAE

By P. VAN ROYEN

Small, usually matted herbs growing in rapids and waterfalls, flowering when the water subsides seasonally, very variable in size, the smaller ones thalloid and closely adhering to the supporting rocks, the larger ones with distinct stems often arising in pairs from long and thin roots, in other instances rootless; sterile plants often larger and coarser than the fertile ones. Leaves alternate, di- or tristichous, in the stemless species sometimes united at the base and springing in 2 rows from an irregular base, entire or much divided, sometimes with bundles of minute threads on one or both sides; stipule 1, a sheath and a ligula sometimes present. Flowers solitary or fascicled between the leaf-bases or at the ends of short branches or in distinct inflorescences, hermaphrodite, actinomorphic or zygomorphic, the younger ones enveloped by a thin spathe or by a few leaves. Tepals 2 to many, distinct or reduced to minute scales, free or united. Stamens 1 to many, alternate with the tepals in a complete or incomplete whorl, free or united to the tepals; anthers sagittate, 4-celled, dehiscing by 2 longitudinal slits, introrse or extrorse, dorsi- or basifixed; pollen 1- or 2-celled. Ovary superior, sometimes oblique or nearly perpendicular to the (frequently) distally enlarged pedicel, 2- or 3-, or sometimes 1-celled; carpels equal or unequal, ribbed or smooth without, the placenta axile, fleshy, with 2 to numerous anatropous ovules; ovules with 2 integuments; styles 2-3, free or cohering, each with a distinct stigma. Fruit dehiscing septifragal with 2 or 3 valves, in fruits with unequal cells the smallest valve sometimes soon falling off; seeds 2 to many, without endosperm.

About 200 species distributed in the tropics throughout the world, ascending the southern Appalachian Mountains in the southeastern United States.

- a. Flower buds enclosed between a few leaves; perianth distinct; ovary 3-celled; leaves entire..... 1. *TRISTICHA*
- aa. Flower buds enclosed in a membranaceous spathe; perianth reduced to minute scales; ovary 2-celled; leaves much divided..... 2. *MARATHNUM*

1. TRISTICHA Du Petit Thouars

TRISTICHA Du Petit Thou. Gen. Nov. Madagasc. 2. 1806.

Dufourea Bory, ex Willd. Sp. Pl. 5:55. 1810.*Philocrena* Bong. in Mem. Acad. Sci. St. Petersb. VI, 3²:80-82. 1835.*Potamobryon* Liebm. in Forhandl. Skand. Naturf. Kjoeb. 5:512. 1847.

Moss-like herbs widely differing in shape and size, much branched, forming dense mats on rocks; stems thin, terete. Leaves tristichous, the rows in the older plants sometimes indistinct, entire, membranaceous, nerved or unnerved, the apex obtuse or acute, often divided into 2 or 3 parts in older leaves. Flowers terminal or on short side-branches, enclosed between 2-3 distinctly larger leaves when young; perianth well-developed, membranaceous, 3-partite, marcescent; stamen 1, the filament slender, the anther ovate, introrse, with elongate connective, the pollen globose; ovary 3-celled, with 3 equal carpels, ovoid to subglobose, rounded or attenuate at the base, the placentas swollen, dehiscing with 3 equal valves each with 3 ribs; seeds numerous.

Tropical and subtropical America, Africa, and Asia.

Fig. 54. *Tristicha trifaria*

1. TRISTICHA TRIFARIA (Willd.) Tul. in Arch. Mus. Hist. Nat. 6:179-189. 1852; Warming, Fam. Podost. 6:28-30, f. 24. 1901.

Dufourea trifaria Willd. Sp. Pl. 5:55. 1810; in Mag. Ges. Naturf. Fr. Berlin 5:63-64. 1811.

Dufourea hypnoides St. Hil. in Mem. Mus. Paris 10:472. 1823.

Tristicha hypnoides (St. Hil.) Spreng. Syst. Veg. 4²:10. 1827; Cario, in Bot. Zeit. 39:25, tab. 1-24. 1881.

Dufourea Boryi A. Rich. in Chev. Dict. Drogues 5:636. 1829.

Philocrena pusilla Bong. in Mem. Acad. Sci. St. Petersb. VI, 3²:80, tab. 6. 1835.

Potamobryon concinnum Liebm. in Forhandl. Skand. Naturf. Kjoeb. 5:513. 1847.

Potamobryon laxum Liebm. loc. cit. 514. 1847.

Potamobryon patulum Liebm. loc. cit. 515. 1847.

Tristichia concinna (Liebm.) I. M. Johnston, in Sargentia 8:130. 1949.

Small herbs with shoots forming dense mats attached to much-branched roots; stems terete, 0.2–9.0 cm. long. Leaves tristichous, the rows at first regularly alternating with one another, the older leaves in irregular whorls of 3–6; one row always on the dorsal side of the stem, these ovate, 0.5 mm. wide to 1 mm. long; the other two rows lateral and at the same level, obliquely inserted, these spatulate, to 1 mm. wide, to 3 mm. long; all leaves definitely nerved, entire, obtuse, sessile, sometimes all alike or the older with 2–4 acute apices; fertile branches with 2–3 membranaceous leaves 2.0–2.5 mm. long, which enclose the young flower. Perianth 3-fid or -partite, the lobes obtuse, nerved, 1–2 mm. long; stamen 1.5–2.5 mm. long, the filament spatulate, distinctly nerved, 1–2 mm. long, the anther sagittate or ovate, truncate, slightly emarginate at the base, about 0.8 mm. long; pollen globose, 16–17 μ in diameter, yellowish; ovary ellipsoid, roundish or attenuate at the base, 0.5–1.0 mm. long, about 0.8 mm. in diameter; styles 3, linear, about 0.5 mm. long, often papillate; pedicel 3–15 mm. long, terete.

Widespread in Central and South America, Cuba, and Africa.

CANAL ZONE: Río Pedro Miguel, Standley 29933, 29934; Río Paraiso, Standley 29878; Quebrada Ancha, Steyermark & Allen 17130; Las Cascadas, near Summit, Dodge & Hunter s. n.; Río Boquerón, Steyermark & Allen 17257; Río Indio, Dodge & Allen 17400.

2. MARATHRUM Humb. & Bonpl.

MARATHRUM Humb. & Bonpl. Pl. Aequinox. 1:40–41, tab. II. 1808.

Lacis Mart. Nov. Gen. & Sp. 1:6. 1824.

Small to medium-sized stemless herbs known to be attached to roots in only a few species, the sterile plants often larger and coarser than the fertile, with an irregular, sometimes branched, adhesive base. Leaves either distichous or inserted along the margin of the thalloid base, repeatedly pinnate with all the pinnae alternate or slightly opposite, or entire with a few lobes along the margin; petiole sometimes fleshy, often dilated at the base. Flowers at first enclosed in a persistent, membranaceous spathe which splits irregularly at the tip, 1 to many, solitary or fascicled between the leaf-bases; pedicel scarcely enlarged at the tip in some species, in others abruptly enlarged; tepals 3–25 in a complete or incomplete whorl, inconspicuous, squamiform to filiform, inserted on the margin of the receptacle in species with enlarged pedicels, but sometimes inserted at different levels in species with normal or scarcely enlarged pedicels; stamens 2–25, in a complete or incomplete whorl (the latter unknown in Panamanian species), rarely united at the base, the filaments lanceolate, 3-angled at the base, sometimes branched, nerved, the anthers sagittate, introrse; pollen ellipsoidal to subglobose, 3-sulcate; ovary 2-celled, ellipsoidal, attenuate at the base, with 2 equal carpels, 8-ribbed; placenta

of the same shape as the ovary, with many ovules; styles 2, filiform or cylindric, cohering at the base or very rarely free, often emarginate. Fruit with 2 equal, persistent, 5-ribbed valves.

Central America, Antilles, northwestern South America.

- a. Pedicels not thickened at the tip; leaves 3-5 times pinnate.
 - b. Stamens one-third to one-half as long as the ovary; pollen ellipsoidal, $17 \times 14 \mu$ 1. *M. STENOCARPUM*
 - bb. Stamens about as long as the ovary.
 - c. Tepals 0.5-1.0 mm. long; styles 2-3 mm. long; pollen ellipsoid, $16 \times 13 \mu$ 2. *M. OXYCARPUM*
 - cc. Tepals 0.5 mm. long or shorter; styles 0.5-2.0 mm. long.
 - d. Leaves shorter than 3 cm., usually some dilated and cuneately fasciate-flabelliform; pollen subglobose, $15 \times 14 \mu$ 3. *M. PUSILLUM*
 - dd. Leaves 0.5-20 cm. long, of essentially similar form throughout.
 - e. Ultimate leaf-divisions filiform or nearly so.
 - f. Leaf rachis not winged, transparent when young; pollen narrowly ellipsoid, $20 \times 11 \mu$; styles 0.5-1.0 mm. long..... 4. *M. LEPTOPHYLLUM*
 - ff. Leaf rachis distinctly winged, not transparent when young; pollen ovoid, $16 \times 14 \mu$; styles 1.0-2.0 mm. long..... 5. *M. INDIFFERENS*
 - ee. Ultimate leaf-divisions usually round to spatulate or triangular, not filiform.
 - f. Leaf rachis narrowly winged; ovary 2.5-3.0 mm. long; pollen subglobose, $15 \times 14 \mu$ 6. *M. CHEIRIFERUM*
 - ff. Leaf rachis not winged; ovary 3.5-4.0 mm. long; pollen ellipsoid, $17 \times 14 \mu$ 7. *M. ALLENII*
 - aa. Pedicels thickened at the tip; leaves repeatedly bifurcate..... 8. *M. FOENICULACEUM*

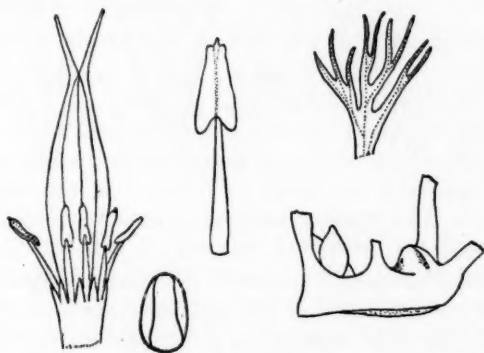


Fig. 55. *Marathrum stenocarpum*

1. *MARATHRUM stenocarpum* (Wedd.) v. Royen, comb. nov.

Marathrum Schiedeanaum (Cham.) Tul. var. *stenocarpum* Weddell, in DC. Prodr. 17:54. 1873.

Small to medium-sized herbs; base cuneiform to more or less discoid, 1-2 cm. wide, 1-3 cm. high. Leaves 3 times pinnate, 3-20 cm. long, all the pinnae ascending at an angle of about 45° ; primary pinnae 0.5-5.0 cm. long, 2-15 cm. apart; secondary pinnae 1-7 mm. long, 2-5 mm. apart; tertiary pinnae repeatedly forked,

Fig. 56. *Marathrum oxycarpum*

the ultimate divisions to 1 mm. long and 0.3 mm. wide, spathulate, acute, mostly nerveless; petiole 0.5–8.0 cm. long, 1–2 mm. wide, flattened, membranaceously dilated at the base and with a more or less distinct, obtuse, membranaceous ligula 1.0–1.5 mm. long. Flowers few, solitary; pedicel 1–4 cm. long; young spathe clavate, acute, 1.0–1.25 mm. long, the older infundibuliform, 3–5 mm. long; tepals 9, lanceolate, acute, nearly 1 mm. long; stamens 9, 1.5–2.0 mm. long, the filaments lanceolate, about 1.5 mm. long, the anthers obtuse, nearly 1 mm. long; pollen ellipsoidal, $17 \times 14 \mu$, the lobes tapering toward one of the poles; ovary narrowly ellipsoid, acute, attenuate at the base, with 6 indistinct and 2 more distinct ribs marking the sutures, 3.5–4.0 mm. long, the styles 2, cylindrical, 3-edged at the base, the narrow wings passing into the midribs of the valves, papillate at the apex only, about 1.5 mm. long. Fruit with 2 distinctly 5-ribbed valves.

Panama and Colombia.

PANAMÁ: Juan Díaz River, Killip 3390. CANAL ZONE: Río Boquerón, *Steyermark & Allen 17255*.

2. *MARATHRUM OXYCARPUM* Tul. in Ann. Sci. Nat. III, 11:94. 1849.

Medium-sized herbs; base 2.5–30.0 mm. long, 2–8 mm. wide. Leaves 3 times pinnate, 3–50 cm. long, with all the pinnae alternate and ascending at an angle of 30–60°; primary pinnae 0.3–9.0 cm. long, 0.2–3.0 cm. apart; secondary pinnae 0.1–2.5 cm. long, 0.5–7.0 mm. apart, sometimes subopposite; tertiary pinnae 3–10 mm. long, 1–2 mm. apart, alternately pinnate with forked lobes, the ultimate divisions spathulate, acute, nerveless, rarely distinctly nerved, to 3 mm. long and 0.3 mm. wide; petiole flattened, slightly ribbed, membranaceously widened, 0.3–12.0 cm. long, 0.5–4.0 mm. wide; rachis straight, with an obtuse membranaceous ligule about 2 mm. long. Flowers solitary; pedicel 4–9 cm. long; young spathe clavate, acute, 2–5 mm. long, the older infundibuliform, 8–10 mm. long; tepals 8–10, triangular, acute, 0.5–1.0 mm. long; stamens 8–10, 5–6 mm. long, the filaments lanceolate, membranaceous, somewhat scaphiform at the base, 4.0–4.5 mm. long, the anthers obtuse, 1–2 mm. long; pollen ellipsoidal, $16 \times 13 \mu$, the lobes tapering toward one of the poles; ovary ellipsoid, acute, base attenuate, flattened, 3.5–5.0 mm. long, 1.5–2.0 mm. wide, ribs 8, distinctly raised, the styles filiform, with widened sometimes emarginate apex, 2–3 mm. long. Fruit with 2 equal, distinctly 5-ribbed valves.

Honduras, Panama, and Colombia.

COCLÉ: Penonomé, *Williams 371*. PANAMÁ: Río Sta. Maria, *Seemann 34*.

3. *MARATHRUM pusillum* v. Royen, sp. nov.

Herbae pusillae. Folia pinnata; pinnis primariis fere 8 pro folio, interdum alata ad rhachem decurrente; pinnis secundariis interdum suboppositis; pinnis tertiariis repetito furcatis; laciniiis ultimis lanceolatis, acutis, enerviis, 0.5–2.0 mm. longis; incisionibus obtusis. Flores 1–3, solitarii vel fasciculati; pedicello apice non dilatato; spathella juvenile clavata, acuta, vetusta infundibuliforme; tepalis 7, squamiformibus; staminibus 7, filamentis lanceolatis basi triangulare; antheris obtusis, emarginatis vel mucronatis; granulis pollinis subglobosis; ovario ovoideo, acuto, basi attenuato, valde applanato, distincte 8-costato, costis paulo prominentibus, duobus eorum indistinctissimis; stylis cylindricis, apice oblique truncatis, facie interne emarginatis, aliquando papillatis. Fructus valvis 2 aequalibus, utraque valva 5-costata.

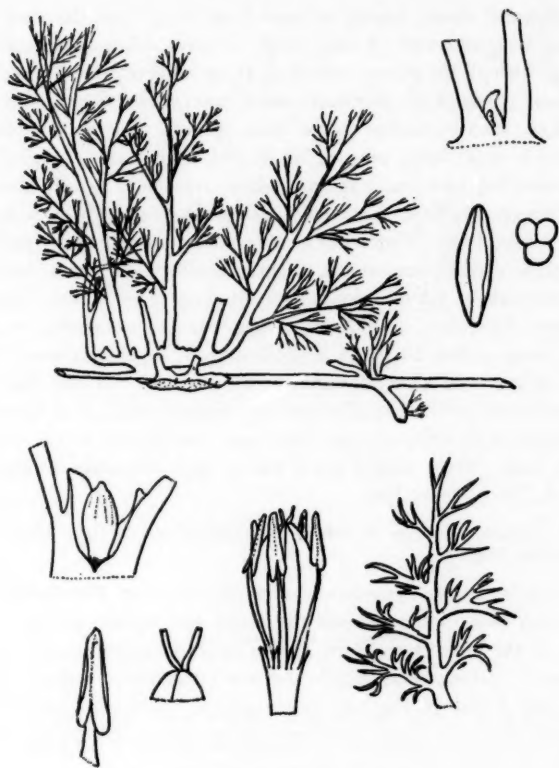
Small species with base 1–4 mm. long and wide, 1–2 mm. thick. Leaves pinnate, 0.5–2.5 cm. long; primary pinnae about 8 per leaf, 1–7 mm. long, sometimes with a broad wing running down the rachis; secondary pinnae 0.5–2.5 mm. long; tertiary pinnae repeatedly forked, 1.0–2.5 mm. long, the ultimate divisions lanceolate, acute, nerveless, to 2 mm. long, the incisions obtuse. Flowers 1–3, solitary or in small groups; pedicel 0.7–2.0 cm. long; young spathe clavate, acute, splitting at the top or side, 1.5–3.0 mm. long, the older infundibuliform, 4–5 mm. long; tepals 7, squamiform, about 0.3 mm. long; stamens 7, about 3.5 mm. long,

Fig. 57. *Marathrum pusillum*

filaments lanceolate, 3-sided at the base, about 2.5 mm. long, anthers 1.0–1.5 mm. long, obtuse, emarginate or mucronate, the thecae unequal; pollen subglobose, about $15 \times 14 \mu$; ovary ovoid, acute, base attenuate, strongly flattened, with 8 very slightly raised ribs (2 of them very indistinct), 2.0–2.5 mm. long, about 1 mm. wide, the styles cylindrical, apex obliquely truncate, emarginate at the inner side, slightly papillate, 1.5 mm. long. Fruit with 2 equal 5-ribbed valves. Leaves sometimes with a dilated and cuneately fasciate-flabelliform rachis about 1 cm. long and 2–3 mm. wide at the tip and there with 3–5 lobes with ultimate divisions as described above.

PANAMÁ: Chagres River, Pittier 2303 (HOLOTYPE in U. S. Nat. Herb.).

This species is recognized easily by its size, since it is the smallest *Marathrum* ever found. The cuneate leaves, which are often on the same specimen with the normal leaves, are characteristic, too, and by these leaves the plants are different from all other *Marathrums*.

Fig. 58. *Marathrum leptophyllum*4. *MARATHRUM leptophyllum* v. Royen, sp. nov.

Herbae parvae, acaules e radicibus longis, tenuibus appalantisque binatim nascentes. Folia tenuia, 3- vel 4-tim pinnata; petiolo juventate hyalino, interdum brevi tenui ligula 1 mm. alta instructo; pinnis primariis pinnatis vel bifurcatis; pinnis tertiariis repetito bifurcatis, laciniiis ultimis lanceolatis, subfiliformibus, membranaceis, acutis, enerviis. Flores pauci, juveniles soli noti: spatha 3-5 mm. longa, clavata, mucronata, subpapillosa, adulta ignota; tepalis 7, lanceolatis, acutis; staminibus 7, filamentis membranaceis, lanceolatis; antheris obtusis vel emarginatis; granulis pollinis $20 \times 11 \mu$, lobis angustis, ovoideis; ovario ovoideo, acuto, basi rotundato vel attenuato, applanato, costis 8, quarum 2 indistinctis; stylis filiformibus, apice oblique truncatis, facie interne emarginatis. Fructus valvis 2 aequalibus, utraque valva 5-costata, costis prominentibus.

Herb with small shoots arising in pairs from long, thin, flattened roots; base about 0.5 cm. long and wide, 2 mm. thick. Leaves delicate, repeatedly pinnate, 3–6 cm. long, with all the pinnae ascending at an angle of 45–90°; petiole 0.5–1.5 cm. long, about 1 mm. wide, membranaceous, transparent when young, sometimes with a distinct, membranaceous ligule about 1 mm. high at the base; primary pinnae 2.5–15.0 mm. long, pinnate or forked, alternate or slightly opposite; secondary pinnae 2–6 mm. long; tertiary pinnae repeatedly forked, about 2.5 mm. long, the ultimate divisions lanceolate, membranaceous, nearly filiform, acute, nerveless, to 2 mm. long. Flowers few, only young ones known: pedicel 1.5–2.0 cm. long; spathe clavate, mucronate, slightly papillate, 3–5 mm. long; tepals 7, lanceolate, acute, about 0.5 mm. long; stamens about 2.5–3.0 mm. long; filaments membranaceous, lanceolate, 1.5–2.0 mm. long, the anthers obtuse or emarginate, 1.0–1.5 mm. long; pollen $20 \times 11 \mu$, lobes narrow, tapering toward the 2 poles; ovary ovoid, acute, rounded or attenuate at the base, 2.5–3.0 mm. long, about 1.5 mm. wide, flattened, 8-ribbed, all the ribs very slightly raised, 2 of them indistinct; styles 2, filiform with obliquely truncate apex, emarginate at the inner margin, 0.5–1.0 mm. long. Fruit with 2 equal valves, each distinctly 5-ribbed, the ribs slightly raised, 2.5–3.0 mm. long.

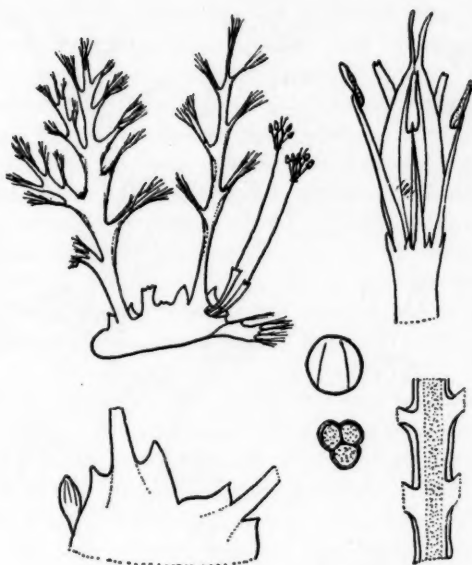
CHIRIQUÍ: Boquete, Woodson & Schery 805 (HOLOTYPE in Gray Herb.; ISOTYPE in Herb. Missouri Bot. Gard.).

This species somewhat resembles young specimens of *Marathrum indifferens* but differs from that species because the rachis and petiole are not winged. It differs from all the other *Marathrum* species in its transparent petioles, its nearly filiform ultimate leaf-divisions which also are transparent, and in the long and very narrow but distinctly 3-sulcate pollen grains. It closely resembles *M. tenue*, but that species has only 2 or 3 stamens and its rachis and petiole are narrowly winged.

5. *MARATHRUM indifferens* v. Royen, sp. nov.

Folia ea *Marathri tenui* simulantia sed basi instructa dilatationem membranaceam distincte punctatam, 3- vel 4-tim pinnata; pinnis primariis ala lata rhachi adnatis, interdum fere oppositis, 60–90° rhachi declinatis; pinnis tertiariis repetito bifurcatis, laciniis ultimis subfiliformibus, acutis, erneviis. Flores pauci; spathellis demum 4–12 mm. longis; pedicello saepe 2-alato; tepalis 5–8, squamiformibus; staminibus 5–8, filamentis lanceolatis, membranaceis, antheris acutis vel emarginatis; granulis pollinis $16 \times 14 \mu$; ovario ovoideo, 8-costato; stylis juvenilibus 0.8 mm., veteribus 1.5–2.0 mm. longis, linearibus, apice emarginato vel acuto.

Small herb; base branched or unbranched, 0.5–4.5 cm. long, 0.5–10.0 mm. high, 1–3 mm. thick. Leaves 0.5–15.0 cm. long, 3–4 times pinnate, with all the pinnae alternate or slightly subopposite and ascending at an angle of 60–90°; primary pinnae 1–3 cm. long, widened in the axil and with a distinct wing decurrent upon the rachis; secondary pinnae 1–4 mm. long, the ultimate divisions 0.5–5.0 mm. long, nearly filiform, acute, nerveless; petiole terete or flattened, widened at

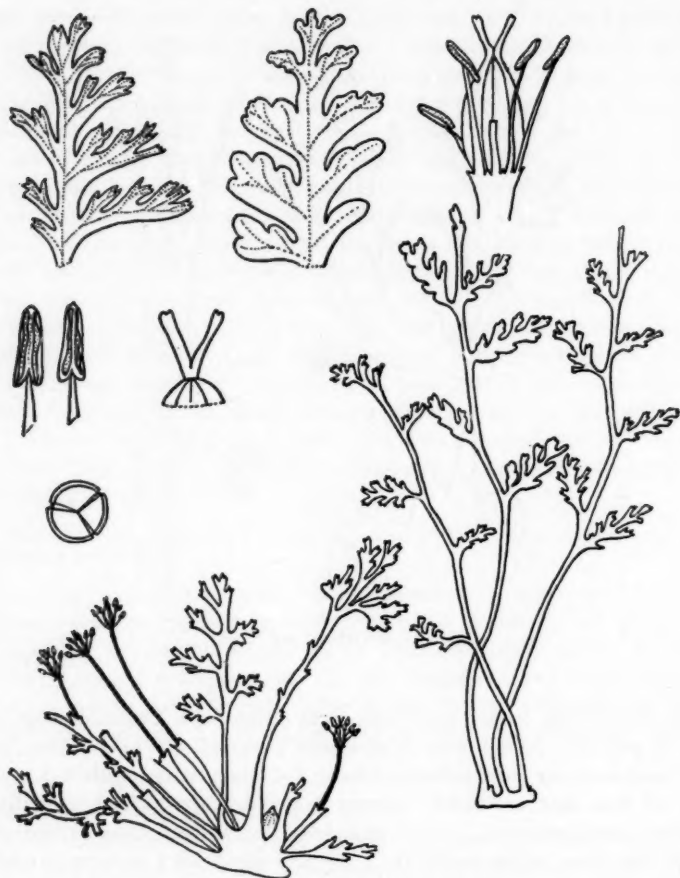
Fig. 59. *Marathrum indifferens*

the base, 0.5–3.5 cm. long, 0.5–1.5 mm. wide, dilated with 2 pointed wings at the base. Flowers few; pedicel terete or sometimes 2-winged, 1.5–5.0 cm. long; young spathe unknown, the older infundibuliform, 4–12 mm. long; tepals 5–8, squamiform, 0.5 mm. long or shorter; stamens 5–8, 3.0–6.5 mm. long, the filaments lanceolate, membranaceous, 2.5–5.0 mm. long, the anthers acute or emarginate, 1.0–2.2 mm. long; pollen ovoid, $16 \times 14 \mu$, 3-lobed, lobes tapering toward one pole; ovary ovoid, acute, base attenuate, 2.2–4.0 mm. long, 1.5–1.8 mm. broad, flattened, 8-ribbed; styles 1–2 mm. long, linear, emarginate or acute. Fruit with 2 equal valves, each 5-ribbed.

Mexico, Guatemala, British Honduras, and Panama.

CANAL ZONE: Río Indio, Dodge & Allen 17398, 17399 (HOLOTYPE in Herb. Utrecht; ISOTYPE in Herb. Missouri Bot. Gard.); Río Boquerón, Steyermark & Allen 17256; Quebrada Ancha, Steyermark & Allen 17117. CHIRIQUÍ: San Felix, Pittier 5430.

This species closely resembles *M. tenue*, but its rachis and petiole are very distinctly winged; while the latter species has 2–3 stamens, *M. indifferens* has 5–8 stamens. The distinctly pointed dilation at the base of the petioles characterizes *M. indifferens* from all other species of *Marathrum*.

Fig. 60. *Marathrum cheiriferum*6. *MARATHRUM cheiriferum* v. Royen, sp. nov.

Herba pusilla vel mediocris, acaulis; basi irregulari. Folia bis- vel ter-pinnata, 2–20 cm. longa; pinnis primariis leviter nervatis, 30–45° declinatis, laciniis ultimis ovatis, obtusis vel acutis, leviter nervatis vel enervatis, vel interdum oblongis, rotundatis, margine crenulato-lobatis, 0.3–1.0 mm. longis, 0.3–0.8 mm. latis; petiolo tereti vel applanato, rhachide striata, anguste alata. Flores pauci, solitarii; spathella claviformi, acuta, deinde infundibuliformi; tepalis 6–8, triangularibus, acutis, minus quam 0.5 mm. longis; staminibus 6–8, filamentis subulato-lanceolatis, nervatis, antheris apice obtuso vel mucronato; granulis pollinis globosis, $15 \times 14 \mu$;

ovario ellipsoideo, apice acuto, basi attenuato, costis 8 distinctis, costis suturalibus juventute indistinctis; stylis filiformibus vel spathulatis apice emarginatis, obtusis, basi paullo connatis, leviter papillatis; capsula valvis 2 aequalibus, distincte 8-costatis.

Small to medium-sized herbs; base irregular, 0.5–2.0 cm. long, 2–8 mm. wide, 1–2 mm. thick. Leaves 2–3 times pinnate, with all the pinnae ascending at an angle of 30–45°, 2–20 cm. long; primary pinnae 0.6–4.0 cm. long, 10–20 per leaf, the ultimate pinnae a few times forked; ultimate divisions to 1 mm. long and about 0.5 mm. wide, ovate, obtuse to acute, slightly nerved or nerveless, or the ultimate divisions rotundate and margins crenulate to lobed; petiole terete to flattened, 0.5–5.0 cm. long, 0.5–2.0 mm. wide at the base, the rachis distinctly striate and narrowly winged. Flowers few, solitary; pedicel terete, 0.5–5.0 cm. long; young spathe clavate, acute, 2–5 mm. long, the older infundibuliform, 6–10 mm. long; tepals 6–8, triangular, acute, less than 0.5 mm. long; stamens 6–8, 3.0–5.5 mm. long; filaments at first subulate but later lanceolate, membranaceous, 3-sided at the base, 2.5–4.5 mm. long; anthers obtuse or mucronate, 1.0–1.5 mm. long; pollen globose, slightly 3-sulcate, $17 \times 14 \mu$; ovary ovoid to ellipsoid, acute, base attenuate, slightly flattened, definitely 8-ribbed, 2 of the ribs indistinct, in young flowers 2.5–3.0 mm. long, 1.0–1.5 mm. wide; styles filiform or spathulate, obtuse, emarginate, slightly papillate, 1.0–1.5 mm. long. Fruit with equal valves, each distinctly 5-ribbed.

Costa Rica, Panama, and Colombia.

COCLÉ: Río Mata Ahogada, Valle Chiquita, *Martin 2979*; Río Antón, *Hunter & Allen 351*. PANAMÁ: Río de Jesús, *Bouché s. n.* (HOLOTYPE in Herb. N. Y. Bot. Gard.).

Closely resembles *M. minutiflorum* but is easily distinguished by the shortly triangular ultimate leaf-divisions, those of the latter being spathulate.

7. *MARATHRUM ALLENII* Woodson, in *Ann. Mo. Bot. Gard.* 25:827. 1938.

Small herbs; base irregular, sometimes branched, 0.5–7.0 cm. wide, 0.5–4.0 cm. high. Leaves 1–20 cm. long, 3–4 times pinnate, with all the pinnae ascending at an angle of 30–60°; primary pinnae 0.3–3.0 cm. long, membranaceously widened in the axils; secondary pinnae 1–1.5 mm. long, the ultimate pinnae a few times forked, the ultimate divisions spathulate, mostly acute, nerveless or seldom indistinctly nerved, to 1.5 mm. long and 0.3 mm. wide; petiole dilated at the base, with a membranaceous, acute to obtuse or emarginate ligule 1–2 mm. long and 1 mm. wide, which sometimes is markedly shifted toward the ventral side, 0.3–7.0 cm. long, 0.5–2.0 mm. wide. Flowers several; pedicel 1.0–7.5 cm. long, terete or 2-winged; spathe clavate, the young 2–8 mm. long, obtuse or mucronate, smooth or slightly papillate, the older infundibuliform, 7–15 mm. long; tepals 6–9, scale-like, 0.5 mm. long or shorter; stamens 5–9, 4.0–5.5 mm. long, the filaments lanceolate, membranaceous, sometimes split at the top, the anthers acute, obtuse or emarginate,

Fig. 61. *Marathrum Allenii*

1.0–2.5 mm. long; pollen ellipsoidal, $17 \times 14 \mu$, the lobes tapering toward one pole; ovary ovoid or ellipsoid, 3.5–4.0 mm. long, terete, acute, sessile or attenuate at the base, 8-ribbed, the ribs slightly raised; styles filiform, narrow, 3-sided at the base, obtuse or slightly emarginate, papillate, nerved, 0.5–2.0 mm. long. Fruit with 2 equal 5-ribbed valves, the ribs but slightly raised.

Panama.

CHIRIQUÍ: Remedios, Pittier 5443. COCLÉ: El Valle de Antón, Allen 82; same locality, Woodson & Schery 160.

8. *MARATHRUM FOENICULACEUM* Humb. & Bonpl. Pl. Aequinox. 1:40, tab. II. 1808.

Lacis foeniculacea (H. & B.) Mart. Nov. Gen. & Sp. 1:6. 1824.

Medium-sized herb; base irregular, 0.5–2.0 cm. long, 1.0–1.5 cm. wide. Leaves 2.5–35.0 cm. long, repeatedly bifurcated or rarely 3–6 times pinnate; lateral lobes 3–6 times bifurcated or rarely pinnate, 0.5–10.0 cm. long, ascending at an angle of 30–60°, the ultimate divisions 0.5–12.0 mm. long, narrow, obtuse or acute, nerveless or very rarely nerved; petiole 1–8 cm. long, flattened, membranaceously widened at the base, with a distinct, sometimes very irregular ligule 2–3 mm. long and 5 mm. wide. Flowers solitary or in fascicles between the leaf bases; pedicel 1.0–1.5 cm. long, thickened into a disc at the tip; young spathe acute, 0.5–1.0 cm. long, the older tubular or infundibuliform, 0.5–1.0 cm. long; tepals 5–8, triangular, acute or acuminate, about 1 mm. long; stamens 5–8, 3.5–5.5 mm. long, the filament lanceolate, scaphiform at the base, sometimes slightly united, 3–4 mm. long, the anthers obtuse, about 1 mm. long; pollen nearly globose, about $18 \times 15 \mu$, the lobes very wide at one pole and tapering toward the other; ovary ellipsoid, acute, base attenuate, flattened, distinctly 8-ribbed, 3.0–4.5 mm. long, 1.0–1.5 mm. wide; styles flattened or subulate, acute or emarginate, 1.0–2.5 mm. long. Fruit dehiscent with 2 equal, 5-ribbed valves.

Mexico to Colombia.

PANAMA: locality unknown, *Hayes 824*.

SAXIFRAGACEAE

By ELIZABETH McCLINTOCK

Deciduous or evergreen shrubs or small trees, or perennial, rarely annual, herbs. Leaves alternate or opposite, mostly simple but variable in form, usually without stipules. Inflorescence various; flowers mostly perfect and actinomorphic, medium-sized or small, rarely large and showy; receptacle various, flat or often concave and forming a hypanthium more or less adnate to the ovary; sepals 4 or 5, rarely more; petals as many as the sepals, imbricate or valvate, free; stamens as many as petals and alternate with them, or twice as many as petals, rarely more numerous; filaments subulate or filiform; anthers rotund or oblong, 2-celled, opening lengthwise; carpels usually united and fewer than petals, seldom partially free and equal in number to the petals; ovary superior or partly or wholly inferior, placentae parietal or axillary, rarely otherwise, ovules usually numerous, styles the same number as carpels, free or partially united. Fruit a dehiscent capsule or a berry; seeds usually numerous, small and occasionally winged.

About 70 genera, widely distributed in both hemispheres, mostly in temperate to subarctic regions, rare in the tropics where only certain woody genera are found. Four genera in Panama.

The Central and South American species of *Hydrangea* belong to the Section *CORNIDIA* Engler (Nat. Pflanzenfam. 3^{2a}:76. 1890), characterized by being evergreen climbers or shrubs with coriaceous leaves. *CORNIDIA* does not occur exclusively in the New World, several species having been described from the Philippine Islands and Formosa. In addition to *CORNIDIA* there are two other sections in the genus which occur in the eastern United States and in China and Japan where the genus is concentrated.

There are two types of inflorescence in *CORNIDIA*. The most common consists of a single cyme, with or without sterile flowers. The second type consists of several cymes one above the other, and does not have sterile flowers. The Central American species have only the first type, but both types are found in the South American species. The characters distinguishing the species within each group are usually found in the flowers: in the presence or absence of sterile flowers, in the size, shape and number of styles, and in the length of the stamens. Because of the small size of the flowers these differences are not readily seen.

Sterile, juvenile plants, quite different from the adult flowering plants, have been collected in Central and South America in areas where the genus occurs. Juvenile plants have small, membranous, serrate or entire leaves borne on slender climbing stems. There are no distinctive generic or specific characters associated with these plants, and they passed unrecognized until they were finally associated with *Hydrangea*.

- a. Flowers epiphyllous, borne in few-flowered cymes along the midvein on the upper leaf surface, inconspicuous, greenish; petals less than 1 mm. long; fruit a few-seeded berry..... 4. PHYLLONOMA
- aa. Flowers not epiphyllous, conspicuous, white or colored; petals 2 mm. or more long; fruit a many-seeded capsule.
 - b. Inflorescence a many-flowered cyme, often bearing a few large sterile flowers in addition to the smaller, fertile ones; fertile flowers with petals about 2 mm. long, deciduous during anthesis; stamens twice as many as petals; capsule opening at apex between the styles; styles developing during maturity of fruit to about double their size in anthesis..... 1. HYDRANGAEA
 - bb. Inflorescence a few-flowered cyme, or flowers borne singly, flowers alike; petals 10 mm. or more long, persistent during anthesis; stamens same number as petals or numerous; capsule opening from base between the valves or from the apex loculicidally; styles not developing further during maturity of fruit.
 - c. Sepals and petals 4, stamens numerous; petals 15-20 mm. long, obovate, spreading; capsule dehiscent loculicidally from apex; leaves deciduous; leaves and branchlets hirsute-strigose..... 3. PHILADELPHUS
 - cc. Sepals, petals and stamens 5; petals 10 mm. long, linear-spathulate, erect, appearing to cohere and to form a tubular corolla; capsule dehiscent from base between the valves; leaves evergreen; leaves and branchlets resinous and glandular..... 2. ESCALLONIA

1. HYDRANGAEA L.

HYDRANGAEA L. Sp. Pl. 397. 1753.

Cornidia Ruiz & Pav. Fl. Peruv. et Chil. Prodr. 53, t. 35. 1794.

Sarcostyles Presl, ex DC. Prodr. 4:15. 1830.

Woody climbers or shrubs, inflorescence and adjacent stem pubescent with stellate hairs, or tomentose with long, curling silky hairs. Leaves opposite, simple, blades penninerved, margins remotely denticulate or entire, oval, broadest near middle, petiole stout. Inflorescence cymose (in Central America), terminal, or occasionally lateral, subtended by chartaceous, caducous involucre bracts; sterile flowers showy, pink or white, not always present; fertile flowers white or maroon, small; hypanthium hemispheric; calyx-lobes 4, inconspicuous, deltoid; petals 4, oblong, valvate, deciduous during anthesis; stamens 8, occasionally 10, filaments long and filiform or short and inconspicuous, anthers oblong to somewhat rounded; ovary inferior, 2- to 4-celled, styles 2-4, erect and spreading, or occasionally coherent in bud and early anthesis, continuing to elongate with the maturing capsule; stigmas terminal and more or less decurrent on inner surface; ovules numerous, borne on axial placentae; capsule 2- to 4-celled, truncate, thick-walled, dehiscent at apex between the spreading styles; seeds numerous, very small, linear, arcuate.

- a. Sterile flowers present; styles usually 2, slender or clavate.
 - b. Stamens conspicuous, filaments 1-3.5 mm. long, 2-7 times as long as styles; styles (during anthesis) less than 1 mm. long, slender, acute at apex..... 1. *H. OERSTEDII*
 - bb. Stamens inconspicuous, filaments 0.2-0.9 mm. long, shorter than styles; styles (during anthesis) 1-2 mm. long..... 2. *H. PERUVIANA*
- aa. Sterile flowers absent; styles usually 3, thickened at base..... 3. *H. PRESLEII*

1. *HYDRANGEA OERSTEDII* Briq. in Ann. Conserv. & Jard. Bot. Genève 20:407. 1919.

Cornidia radiata Oerst. in Naturhist. Foren. Kjoeb. Vidensk. Meddel. 42. 1856, non *Hydrangea radiata* Walt. Fl. Carol. 251. 1788.

Hydrangea durifolia Briq. loc. cit. 406. 1919.

Hydrangea Goudotii Briq. loc. cit. 404. 1919.

Hydrangea platyphylla Briq. loc. cit. 401. 1919.

?*Hydrangea Seemannii* Riley, in Kew Bull. Misc. Inf. 207. 1924.

Woody climbers or shrubs, pubescence of stellate hairs, sparse to moderate on inflorescence and adjoining stem, occasionally densely pubescent with long curling hairs (*Woodson & Schery 511*); leaves oval, 10-15 cm. long, 4-7 cm. wide, their length 2 to 2½ times their width (Central America), usually pubescent as the inflorescence on lower surface, upper surface glabrous, margin remotely denticulate to nearly entire, petiole stout, 1-2 cm. long; inflorescence open and spreading, longest branches 4-10 cm. long; sterile flowers present, pink, fertile flowers maroon; hypanthium 1-1.5 mm. long; calyx-lobes 0.5 mm. long; petals 1-2 mm. long, 1 mm. wide; stamens 8, 2-4.5 mm. long, filaments 1-3.5 mm. long, 2 to 7 times as long as styles; styles 2, rarely 3, 0.3-1 mm. long (during anthesis), slender, acute at apex, stigma inconspicuous; capsule 2 mm. long, 2.5 mm. wide at apex, mature styles 2 mm. long.

? Mexico, Costa Rica to Peru.

CHIRIQUÍ: central valley of Río Chiriquí Viejo, 1800-2000 m., *Allen 1400*; Bajo Mono and Quebrada Chiquero, 1500 m., *Woodson & Schery 511*. COCLÉ: region north of El Valle de Antón, 1000 m., *Allen 2693, 3712*.

2. *HYDRANGEA PERUVIANA* Moric. in DC. Prodr. 4:14. 1830.

Cornidia peruviana (Moric.) Small, in N. Am. Fl. 22:161. 1905.

Hydrangea Trianae Briq. in Ann. Conserv. & Jard. Bot. Genève 20:403. 1919.

Hydrangea panamensis Standl. in Jour. Wash. Acad. Sci. 17:10. 1927.

Hydrangea Weberbaueri Engler, in Engl. & Prantl, Nat. Pflanzenfam. 18a:207. 1930.

Hydrangea caucana Engl. loc. cit. 206. 1930.

Woody climbers or shrubs, pubescence of stellate hairs, sparse to moderate on inflorescence and adjoining stem; leaves oval, 10–23 cm. long, 5–14 cm. wide, their length 2 to 3 times their width, both surfaces usually glabrous, margin entire to remotely denticulate; inflorescence open and spreading, longest branches 5–15 cm. long; sterile flowers present, pink, fertile flowers maroon, hypanthium 1.5 mm. long; calyx-lobes 0.4 mm. long; petals 1.5 mm. long, 1 mm. wide; stamens 3, 0.4–1.6 mm. long, filaments 0.2–0.9 mm. long, always shorter than styles; styles 2, rarely 3, 1–2 mm. long (during anthesis), clavate, stigma conspicuous, extending from apex along inner surface; capsule 2 mm. long, 2.5 wide at apex, mature styles 2 mm. long.

Costa Rica to Peru.

COLÓN: along Rio Fato, 10–100 m., Pittier 3919. CHIRIQUÍ: Boquete Distr., Bajo Chorro, 2000 m., Davidson 74; valley of the upper Río Chiriquí Viejo, White goa.

Hydrangea peruviana Moric. is very close to *H. Oerstedii* Briq. They are similar in habit, vegetative characters and fruits, and both have showy, pink, sterile flowers. Their only difference lies in the length of their stamens and styles. In *H. Oerstedii* the filaments are several times longer than the styles. The styles are slender, lack a prominent stigmatic surface and are less than 1 mm. in length. The prominent stamens can be seen with a lens or even the naked eye. The filaments of *H. peruviana*, on the other hand, are shorter than the styles which are clavate and from 1 to 2 mm. long. With the aid of a hand-lens it should be possible to distinguish between these two species in the field, provided that flowers are present.

3. *HYDRANGEA PRESII* Briq. in Ann. Conserv. & Jard. Bot. Genève 20:409. 1919.

Cornidia umbellata Ruiz & Pav. Syst. Veg. 91. 1798.

Sarcostyles peruviana Presl, ex DC. Prodr. 4:15. 1830, non *Hydrangea peruviana* Moric. in DC. Prodr. 4:14. 1830.

Hydrangea umbellata Briq. loc. cit. 411. 1919, non Rehder.

Hydrangea ecuadorensis Briq. loc. cit. 410. 1919.

Hydrangea Briquetii Engler, in Engl. & Prantl, Nat. Pflanzenfam. 18a:207. 1930.

Woody climbers or shrubs, pubescence of stellate hairs sparse to moderate on inflorescence and adjoining stem; leaves oval, 9–20 cm. long, 4–9 cm. wide, their length 2 to 3 times their width, margin entire and somewhat undulate, petiole stout, 15–20 mm. long; inflorescence more or less compact, longest branches 4–9 cm. long, sterile flowers absent, fertile flowers maroon; hypanthium 1.5 mm. long; calyx-lobes 0.5 mm. long; petals 1.5–2 mm. long, 1 mm. wide; stamens 8, 1.5–2 mm. long, filaments 1–1.5 mm. long, approximately as long as styles (in Central America); styles usually 3, occasionally 2 or 4, 0.8–1.5 mm. long (during anthesis),



Fig. 62. *Hydrangea peruviana*

thickened at base, stigma usually extending from apex along inner surface; capsule 2 mm. long, 2.5 mm. wide at apex, mature styles 1.5–2 mm. long.

Costa Rica, Panama, Ecuador, and Peru.

COCLÉ: vicinity La Mesa, hills north of El Valle de Antón, 1000 m., *Allen* 2332.

Hydrangea Preslii differs from the other two species in the lack of sterile flowers and in the number and shape of the styles. The styles are usually 3, although occasional flowers may have 2 or 4. They are thickened at the base and attenuate toward the apex, while in the others they are slender or clavate.

2. ESCALLONIA Mutis

ESCALLONIA Mutis ex L. f. Suppl. 21. 1781.

Stereoxylon Ruiz & Pav. Fl. Peruv. et Chil. Prodr. 38, t. 6. 1794.

Small trees or shrubs, evergreen, rarely deciduous. Leaves alternate, shortly petiolate, lanceolate, oblong-elliptic or lance-obovate, mostly leathery and glandular-serrate. Inflorescence racemose or paniculate, few- to many-flowered, or flowers borne singly; hypanthium nearly globose or turbinate, completely or partially united to ovary, calyx-lobes 5, ovate, subulate at apex; petals 5, imbricate in bud, linear-spathulate, with long, erect claws which appear to be coherent and to form a tubular corolla, bearing at their apices spreading blades; stamens 5, inserted on margin of hypanthium, erect; filaments filiform, anthers oblong-ovoid; ovary with 2–3 complete or incomplete chambers, with 4–6 placenta which hang from an apical, central axis and bear numerous ovules; style mostly simple, rarely 2-parted at apex, with capitate or lobed stigma; capsule with 2–3 chambers, septicidally dehiscent from the base into 2 or 3 valves which hang together by the bundles of the hypanthium and the partitions, after the partial or complete shedding of the epicarp (hypanthial wall and style); seeds many, usually small, often curved, with longitudinal grooves in the covering, fimbriate at base.

A large genus, mostly of the Andes and southern Brazil in South America, with two species in the mountains of Central America. One species in Panama.

1. ESCALLONIA POASANA Donn. Sm. in Bot. Gaz. 23:243–244. 1897.

Small tree up to 25 feet tall, irregular in shape; branchlets short, closely leafy, somewhat resinous and glandular; leaves 10–20 mm. long, 6–9 mm. wide, obovate, rounded at apex, cuneate at base and narrowed to a short petiole 2–3 mm. long, margins finely denticulate, at least in upper half, somewhat resinous, subcoriaceous, lower surface whitened and reticulate, upper surface green; flowers white, borne singly, apically or laterally, on the short branchlets, peduncles 5–15 mm. long; hypanthium united to ovary in lower half, 7 mm. long, diameter at upper margin 6 mm., calyx-lobes 2 mm. long, deltoid, acuminate toward apex, margins fimbriate; petals 10 mm. long, blade 3 mm. long, scarcely broader than claw, rounded at apex with a short mucro at tip, margins fimbriate; stamens 7.5 mm. long, filaments 5

mm. long, anthers oblong; style entire, 5 mm. long, stigma depressed-globose, crenate on margin; capsule 7-8 mm. long, at upper margin 7 mm. in diameter, bilocular, dehiscent at base.

Costa Rica and Panama.

CHIRIQUÍ: Boquete Distr., Volcán de Chiriquí, 10,400 ft., *Davidson 1054, 1306*; Chiriquí Volcano, 2800-3000 m., *Pittier 3079*; Río Chiriquí Viejo, *White 6*.

3. PHILADELPHUS L.

PHILADELPHUS L. Sp. Pl. 470. 1753.

Syringa Adans., Fam. Pl. 2:244. 1763.

Deciduous shrubs with slender, arching and occasionally scandent stems with close or sometimes flaking bark. Leaves opposite, entire or dentate, sessile or shortly petiolate, lower surface often pubescent with simple hairs, upper surface green and glabrous or with few scattered pili, usually with 3-5 prominent veins from base. Flowers white, showy, often fragrant, solitary or in few-flowered terminal cymes; hypanthium turbinate, united with the ovary, calyx-lobes 4, rarely 5-6; petals 4, rarely 5-6, obovate, rounded or retuse at apex, convolute in bud; stamens 20 or more, filaments flat, subulate, anthers small, oblong; ovary inferior to half superior, 4 or rarely 3 or 5 chambers, placentae axial, bearing numerous ovules; styles 3-5, filiform, more or less united, each bearing an elongate stigma; capsule turbinate, ligneous or coriaceous, 3-5 chambers, dehiscing loculicidally from the top; seeds numerous, oblong.

About 40 species in North and Central America, eastern Asia and southern Europe.

1. PHILADELPHUS MYRTOIDES Bertol. Fl. Guat. 21, *tab. 7* (in Nov. Comm. Acad. Sci. Inst. Bonon. 4:421, *pl. 43*). 1840.

Philadelphus trichopetalus Koern. in Regel's Gartenfl. 16:73. 1867.

Shrub with arching, strigose and often scandent stems; leaves 3-9 cm. long, ovate, acuminate at apex, rounded at base, remotely denticulate, 3- to 5-nerved at base, pale and hirsute-strigose beneath, green with few pili above, short-petiolate; flowers pedicellate, 1-3, on short branchlets; hypanthium and calyx grayish-strigose, calyx-lobes 5-10 mm. long, deltoid-acuminate; petals 15-20 mm. long, broadly obovate or suborbicular, glabrous or finely villous on both surfaces; stamens and style about one-half as long as petals; capsule 10 mm. long.

Guatemala, also in Costa Rica and Panama, but perhaps indigenous only in Guatemala. Close to *Philadelphus mexicanus* Schlecht. of southern Mexico.

CHIRIQUÍ: Bajo Mona and Quebrada Chiquero, 1500 m., *Woodson & Schery 588*—"Side of a footpath, possibly an escape."

4. PHYLLONOMA Willd.

PHYLLONOMA Willd. ex Roem. and Schult. Syst. Veg. 6:210. 1820.

Dulongia HBK. Nov. Gen. & Sp. 7:76. 1825.

Shrubs or small trees, completely glabrous; leaves alternate, membranous or coriaceous, lanceolate to ovate-lanceolate, long-acuminate toward apex, entire or denticulate, petiolate. Inflorescence few- to many-flowered, cymose or racemose, arising from the midvein on the upper surface of the leaves near the base of the acuminate tip; flowers small, greenish-white; hypanthium turbinate, completely attached to ovary, disc epigynous, thick, covering base of petals and stamens; calyx-lobes 5, deltoid, minute; petals 5, valvate in bud, spreading in anthesis, deltoid-ovate, acute at apex; stamens 5, alternating with petals, spreading, fila-



Fig. 63. *Phyllonoma ruscifolia*

ments short, subulate; ovary inferior, 1-celled with 2 rows of erect ovules on 2 parietal placentae, very short, styles 2, scarcely protruding from disc, spreading, with stigmatic surface at apex; fruit a berry, with scars of sepals and petals at apex, imperfectly 2-celled; seeds 3-6, small, oblong.

A small genus occurring from the high mountains of southern Mexico through the Andes to Bolivia, with one species in Panama.

1. PHYLLONOMA RUSCIFOLIA Willd. ex Roem. and Schult. Syst. Veg. 6:210. 1820.

Dulongia acuminata HBK. Nov. Gen. & Sp. 7:78, pl. 623. 1825.

Small tree to 20 feet; leaves ovate-lanceolate, coriaceous, blade 40-85 mm. long, 10-30 mm. wide, gradually narrowed to the slender pointed acumen 10-25 mm.

long, remotely denticulate below acumen nearly to base; inflorescence immediately below acumen or on its lower half, several-flowered; hypanthium broadly turbinate, disc 0.7 mm. across; calyx-lobes 0.2 mm. long; petals 0.5 mm. long; stamens less than half as long as petals; styles and stigmas 0.1 mm. long; berry 4 mm. in diameter, white turning black on drying.

Costa Rica to Bolivia.

CHIRIQUÍ: Boquete Distr., Cerro Horqueta, *von Hagen* 2043.

CUNONIACEAE

1. WEINMANNIA L.

WEINMANNIA L. Syst. ed. 10, 2:1005. 1759; Engl. in Engl. & Prantl, Nat. Pflanzenfam. 18a:250. 1930.

Arnoldia Bl. Bijdr. 868. 1826.

Leiospermum D. Don, in Edinb. New Phil. Jour. 9:91. 1830.

Pterophylla D. Don, loc. cit. 93. 1830.

Ornithropus Boj. ex Engl. in Linnaea 36:636. 1870.

Trees or shrubs, the younger branches usually somewhat flattened and rotating to about 45° between the nodes. Leaves opposite, usually imparipinnate, often with the rachis winged between the opposite leaflets, rarely simple; stipules interpetiolar, caducous. Inflorescence frequently appearing terminal but axillary and usually opposite in the upper leaf-axils, a racemiform or spiciform thyse with the pedicels clustered and nearly sessile upon the short side branches. Flowers numerous, small, perfect or polygamo-dioecious; sepals 4-5; petals 4-5, white or somewhat pinkish; stamens 8-10; ovary superior, 2- or rarely 3-celled, each carpel with a gradually produced, persistent style with simple stigma; ovules numerous, in 2 rows upon the axile placentae; disc fleshy, hypogynous, surrounding the ovary but free from the stamens. Fruit a small, thin, septicidally 2- or rarely 3-valved capsule; seeds small, usually pilose.

Weinmannia is a genus of upward of 100 species of the tropics and subtropics of both hemispheres. The species are notoriously variable, and much confusion has resulted from the failure of certain students to appreciate this fact.

- a. Leaves imparipinnate, the rachis broadly winged between the small leaflets; flowering branches relatively distant, the inflorescences not greatly aggregated..... 1. *W. PINNATA*
- aa. Leaves simple; flowering branches conspicuously shortened, the inflorescences appearing greatly aggregated..... 2. *W. PSEUDOLAURINA*

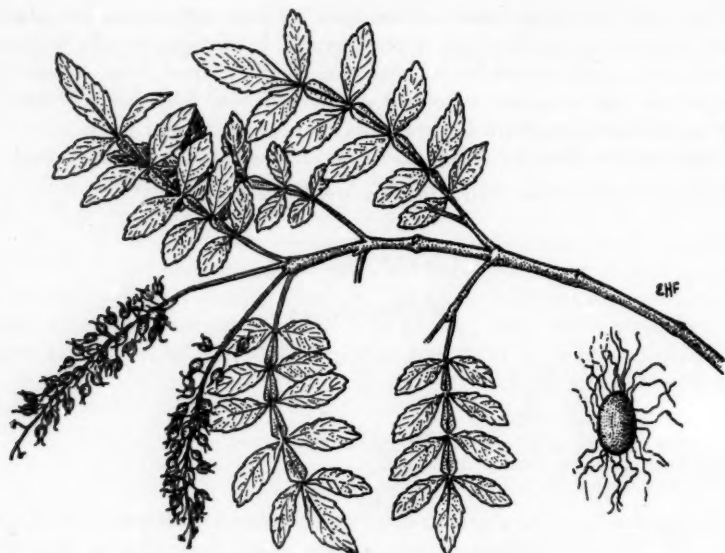
1. WEINMANNIA PINNATA L. Syst. ed. 10, 2:1005. 1759.

Weinmannia glabra L. f. Suppl. 228. 1781 (based on *W. pinnata* L.).

Weinmannia intermedia Cham. & Schlecht. in Linnaea 5:555. 1830.

Weinmannia burseraeifolia Standl. in Jour. Wash. Acad. Sci. 17:310. 1927.

Weinmannia Liebmannii Engl. in Engl. & Prantl, Nat. Pflanzenfam. 18a:252. 1930, nom. subnud.

Fig. 64. *Weinmannia pinnata*

Large shrub or small tree sometimes as much as 20 m. tall, the younger branches ferruginous-pilose to glabrate. Leaves imparipinnate, petiolate, 3–9 cm. long, the rachis broadly winged in rhombic sectors between the pairs of leaflets; lateral leaflets in 2–6 pairs, oblong-elliptic to obovate, unequally cuneate at the base, acute or obtuse at the tip, rather closely crenulate, about 0.7–3.0 cm. long and 0.5–1.0 cm. wide, wholly glabrous or more or less pubescent beneath; terminal leaflet usually somewhat larger and more symmetrical than the lateral, rhombic-elliptic to obovate, obtuse to acuminate; petiole 0.7–2.0 cm. long. Inflorescences usually distinctly paired in the axils of the uppermost pair of leaves, narrowly cylindrical, 2–9 cm. long, the pedicels 2–3 mm. long, slender, usually more or less ferruginous-pilose like the peduncle; sepals triangular, persistent in fruit, about 1 mm. long; petals white or rarely pinkish, slightly longer than the sepals; stamens with white filaments 2–3 mm. long, the small anthers orange. Capsule glabrous, 3–4 mm. long; seeds pilose.

Southern Mexico to Brazil and Peru; Cuba, Jamaica, and throughout the Antilles, growing in forests as a rule, at temperate altitudes.

CHIRIQUÍ: valley of the upper Río Chiriquí Viejo, vicinity of Monte Lirio, alt. 1300–1900 m., Seibert 288; summit of Cerro Copete, alt. 9000 ft., Allen 4892; Finca Lérica to Peña Blanca, Woodson & Schery 330; Volcán de Chiriquí, Davidson 977; Cerro Horqueta, cloud forest, alt. 6500 ft., von Hagen & von Hagen 2068; vicinity of Finca Lérica, upper forested slopes of Quebrada Velo, alt. 5000 ft., Allen 4736; vicinity of Casita Alta, Volcán de Chiriquí, Woodson, Allen & Seibert 821.

Weinmannia pinnata is a very frequent tree in Chiriquí at altitudes between approximately 1200 and 2500 m. The number, size, and shape of the leaflets, as well as their indument, is exceedingly variable; this has given rise to a formidable array of "species", only the more important of which, from Central America alone, are enumerated above. It is very difficult to understand why Engler (loc. cit. 1930) chose the name *W. glabra* L. f. for the nucleus of this complex, when that name is so clearly based upon the earlier *W. pinnata* L.

2. *WEINMANNIA PSEUDOLAURINA* Woodson, Ann. Mo. Bot. Gard. 28:429. 1941.

Trees at least 8 m. tall; branches strongly compressed and densely ferruginous-pilosulose when young, the flowering internodes greatly contracted. Leaves simple, shortly petiolate, broadly elliptic or elliptic-ovate, rather distantly crenulate, apex obtuse or broadly acute, base obtuse or broadly rounded, 5-9 cm. long, 3.5-5.0 cm. broad, subcoriaceous, glabrous above, inconspicuously pilosulose to glabrate beneath; petiole 2-5 mm. long. Inflorescences densely aggregated in pairs at the tips of the shortened flowering internodes, racemiform, narrowly cylindrical, 6-8 cm. long, the pedicels 3-4 mm. long, ferruginous-pilosulose like the peduncle; sepals persistent in fruit, triangular, about 1 mm. long, very minutely pilosulose; petals unknown; stamens 10, the filaments glabrous, about 2 mm. long. Capsules ovoid, about 3 mm. long, densely ferruginous-pilosulose; seeds densely plumose at both ends.

Endemic tree "very common along edges of grasslands" at altitudes of 600-800 m.

PANAMÁ: Cerro Campana, trail from Campana to Chica, Allen 2656.

This species is particularly conspicuous, and unique amongst *Weinmannias* of its immediate alliance, because of the densely aggregated inflorescences.

ROSACEAE

By ROGERS McVAUGH

Herbs, shrubs or trees with leaves alternate, rarely opposite, simple or compound, usually with conspicuous stipules. Flowers usually perfect and regular, the perianth perigynous, the axis sometimes enlarged to form a flat or concave receptacle or hypanthium bearing the calyx-lobes, petals, and stamens on its margin, and usually lined inside with a glandular disk; calyx-lobes 5 (sometimes 4), imbricate; petals usually 5 and imbricate, sometimes wanting; stamens few to many, often about 20; carpels 1 to many, distinct or united, often connate with the receptacle; styles as many as the carpels, sometimes connate. Fruit various; seeds usually without appreciable endosperm, the cotyledons often fleshy and convex, rarely folded or convolute.

The Rosaceae comprise approximately 100 genera, well represented in almost all parts of the world. They include many plants of economic importance, especially in temperate regions where they are much cultivated for food and orna-

ment (e.g., the genera *Fragaria*, *Rubus*, *Rosa*, *Spiraea*, *Prunus*, *Pyrus*, *Malus*, *Chaenomeles*, *Rhodotypos*, etc.). Some workers have advocated the division of the family into several segregate families, on the basis of characters of the fruit; thus genera with the fruit an achene or a follicle have been made to constitute the Rosaceae proper, genera with drupaceous fruit the Amygdalaceae, and genera with pomaceous fruit the Malaceae. These segregations appear unjustified because of the very large number of characters of the flowers, inflorescences and vegetative parts which are repeated in genus after genus without regard to fruit type, and which together make of the inclusive Rosaceae an easily comprehensible and evidently natural group of related genera. Precise determination of specific limits is difficult in many genera, related groups often seeming to merge morphologically or to differ by minor characters only. Apparently much of the difficulty arises from the frequent occurrence in the family of reproductive methods other than a sexual fusion of haploid gametes followed by regular reduction-division. Several genera are known to include species in which polyploidy, aneuploidy, apomixis and other irregularities have been demonstrated, and it may be supposed that these phenomena have contributed largely to the formation of the numerous minor geographic races which are known to exist, in nature isolated in small disjunct areas or if growing with other related species then barely distinguishable from them.

- a. Leaves pinnately or palmately compound, with 3 or more leaflets.
 - b. Upright or trailing shrubs with prickly canes and leaves (brambles); petals present and conspicuous; fruit of few or numerous drupelets borne on an enlarged receptacle..... 3. RUBUS
 - bb. Herbaceous or low suffrutescent plants with unarmed leaves and stems; corolla wanting.
 - c. Hypanthium covered with barbed spines, in fruit forming a bur; erect plants up to 1 m. tall, the inflorescence spicate or racemose.... 5. ACAENA
 - cc. Hypanthium unarmed; flowers very small (rarely as much as 3 mm. long); plants mostly prostrate or procumbent, the inflorescence cymose, often corymbiform..... 4. ALCHEMILLA
- aa. Leaves simple.
 - b. Herbaceous, usually prostrate plants with lobed leaves; flowers very small (rarely as much as 3 mm. long); corolla wanting; calyx-lobes alternating with bracts, the lobes apparently 8-10 in number; hypanthium at maturity containing a few achenes..... 4. ALCHEMILLA
 - bb. Shrubs or trees with simple unlobed leaves; flowers larger; corolla usually present; calyx-lobes usually 5, without alternating bractlets; fruit dry or fleshy.
 - c. Styles 5, distinct; fruit of 5 thin-walled achenes, or of 5 bony nutlets in a fleshy hypanthium (pome); leaves dentate.
 - d. Fruit of 5 achenes about 2 mm. long; unarmed shrubs with leaves white-tomentose beneath, and flowers in ample panicles 5-15 cm. long..... 1. HOLODISCUS
 - dd. Fruit a pome up to 1 cm. long, red or black; spinescent shrubs, nearly glabrous or the branchlets rufous-pubescent, the flowers in corymbose cymes 2-3 cm. long..... 2. HESPEROMELES
 - cc. Style 1; fruit a dry or fleshy drupe with a single large stone; leaves entire.
 - d. Style terminal on the ovary or essentially so; stamens usually 20; flowers (in Panamanian species) in glabrous simple axillary racemes which are ebracteate at flowering time..... 6. PRUNUS

- dd. Style arising from the base of the ovary; stamens usually 15 or fewer; flowers in cymes or panicles, if in simple racemes these bracteate and pubescent.
- e. Filaments 10-16 mm. long; stamens 3-7..... 9. *HIRTELLA*
- ee. Filaments 1-6 mm. long; stamens 15-20 (-30?) or if only about 3 anther-bearing, then less than 1 mm. long.
- f. Hypanthium 5-6 mm. long (excluding the calyx-lobes) in bud, elongate, somewhat gibbous, the ovary attached laterally somewhat above the base of the hypanthium-cavity..... 10. *COUEPIA*
- ff. Hypanthium 3 mm. long or less in bud and in anthesis, cup-shaped or campanulate, symmetrical, the ovary attached at the base of the internal cavity.
- g. Flowers 8-20, in nearly sessile axillary cymes (2-4 cm. long) shorter than the leaves; low shrub, or medium-sized tree up to 5-6 m. tall..... 7. *CHRYSOBALANUS*
- gg. Flowers very numerous, in axillary and terminal panicles 10-40 cm. long, with divaricate leafless branches; trees, often 10-15 m. tall or more..... 8. *LICANIA*

A weedy immigrant from the United States, *Potentilla norvegica* L., was reported from San José Island by Johnston (*Sargentia* 8:31, 132. 1949). It is not to be expected that this species will maintain itself permanently in competition with the native flora. It is a hirsute herbaceous annual or biennial with 3-foliate leaves, leafy cymes, and conspicuous yellow flowers.

1. *HOLODISCUS* (Koch) Maxim.

HOLODISCUS (Koch) Maxim. in *Acta Hort. Petrop.* 6:253. 1879; Focke in *Engl. & Prantl, Nat. Pflanzenfam.* 3³:18. 1894; Ley in *Bull. Torrey Bot. Club* 70:275-288. 1943, nom. conserv.

Sericotheca Raf. *Sylva Tellur.* 152. 1838; Rydb. in *N. Am. Fl.* 22:261-266. 1908.
Spiraea sect. *Holodiscus* Koch, *Dendr.* 1:309. 1869.

Deciduous shrubs or small trees up to 7 m. tall, with simple, short-petiolate, estipulate, dentate leaves, the blades mostly with a long cuneate entire base, the veins ascending and parallel to the cuneate base, impressed on the upper surface, the lower surface often tomentose. Flowers white, 5-merous, in large terminal panicle-like clusters; pistils distinct, 2-ovulate, alternate with the sepals, inserted on center of disk, each forming at maturity an indehiscent 1-seeded dry fruit.

This genus has experienced several systematic revisions, and those who have worked on it have usually recognized two principal species-groups, one ranging from British Columbia to northern Mexico, the other from southern Mexico to Colombia. The southern group has been distinguished by having long-mucronate teeth on the leaf-blades, by having the stamens not longer than the sepals, and by the rather strongly pubescent outer surface of the petals. The two most recent monographers of *Holodiscus*, Rydberg (in the *North American Flora*) and Ley (in the *Bulletin of the Torrey Botanical Club*) each recognized three species in this "southern group" of the genus, although the two authors differed in their ideas of how the species were to be delimited.

Examination of large series of specimens from western United States indicates that neither author is conservative in delimitation of species, each upholding as species several groups which are morphologically scarcely distinguishable, and in addition are connected by numerous intermediates. The differences between the supposed species are chiefly those in the leaves, which vary in size, shape and vestiture. Study of the meager amount of Central American and South American material which is available indicates that all the supposed species of the above "southern group" are in actuality but representatives of a single species. The leaves are usually oblanceolate or obovate, with the lower surface tomentose and bearing in addition few or many straight silky hairs. Rydberg and Ley have attempted to separate species here on the basis of the pubescence of the upper and lower surfaces of the leaves, respectively, and Ley has also used the shape of the leaf-tip as a criterion. These characters do not seem to be correlated with other morphological ones, however, nor with any geographical area, and in any case both characters are notably untrustworthy in the Rosaceae. The single Panamanian specimen which has been available for study has some leaves rounded at tips and others acute (the usual condition in this genus and other rosaceous ones, the rounded ones being produced first at the initiation of the growing season), so that according to Ley's key it could be either *Holodiscus argenteus* or *H. fissus*; many of the leaves agree precisely in shape with her illustration (Bull. Torrey Bot. Club 70:287, fig. 3. 1943) of *H. argenteus*, but the pubescence of the lower surface is less abundantly provided with silky hairs than most specimens she has called *H. argenteus*, and agrees well with those she has named *H. fissus*. The latter, however, she does not report from south of Guatemala, and it is moreover excluded by having the upper leaf-surface glabrous, not strongly puberulent as in the Panamanian material. The jumble of characters used to separate *H. argenteus* and *H. fissus* is so inconclusive that the latter is here reduced to synonymy, following Standley and Steyermark in the 'Flora of Guatemala' (Fieldiana: Bot. 24:453. 1946).

1. *HOLODISCUS ARGENTAEUS* (L. f.) Maxim. in Acta Hort. Petrop. 6:254. 1879.

Spiraea argentea L. f. Suppl. 261. 1781.

Spiraea fissa Lindl. in Bot. Reg. 26:Misc. 73. 1840.

Holodiscus fissus (Lindl.) C. K. Schneid. Ill. Handb. Laubh. 1:495. 1905.

Sericotheca fissa (Lindl.) Rydb. in N. Am. Fl. 22:265. 1908.

Sericotheca argentea (L. f.) Rydb. loc. cit. 266. 1908.

Shrub usually 1-3 m. high, with gray-tomentulose branchlets strongly but obtusely angled below the decurrent leaf-bases, the bark on older branchlets reddish-brown, exfoliating in long strips; leaves oblanceolate or the youngest obovate (on vigorous shoots becoming elliptic to ovate, larger than noted here, and with acute or attenuate tips), the upper surface appressed-pilose with hairs up to about 0.5 mm. long, or distally puberulent with much shorter hairs, the lower surface densely floccose-tomentose between the veins and in addition appressed-pilose on the veins with hairs up to 0.7 mm. long, and with similar hairs amid the tomentum; blades

Fig. 65. *Holodiscus argenteus*

mostly 1 cm. or less wide (up to 3 cm.), 2-3 (-6) cm. long, rounded to acute at tip, the basal half entire, cuneate, attenuate to a margined petiole 1-3 mm. long, the margin dentate distally with 4-6 (-8) teeth on each edge, each tooth terminating one of the primary veins of the blade, and tipped by a blunt mucro; veins prominent on both surfaces, strongly impressed above, the primary ones parallel to the sides of the cuneate leaf-base; flowers creamy white, in relatively large paniculiform oblong to pyramidal leafless clusters terminating leafy twigs, the inflorescence mostly 5-15 cm. long, bracteate, often with its lower branches distant and elongate; petals 2-3 mm. long, with an ovate to orbicular entire blade and a short broad claw, pilose with white straight hairs on the outer surface at least near base on midvein; stamens usually 20 (1 opposite each petal and 3 opposite each sepal), the filaments subulate, 1.5-2 mm. long, 0.2-0.3 mm. wide at base, the anthers nearly globose in dried material, about 0.3 mm. long; receptacle shallowly concave, tomentose within but the margin thickened into a fleshy glabrous ring with the stamens inserted on its outer edge, the ring strongly 5-lobed in age; styles with capitate stigmas, in flower ascending and parallel, about 1 mm. long, pilose near base; ovaries flattened, heavily white-pilose with hairs 0.5-0.7 mm. long, especially on the sutures, the sides somewhat hairy or glabrous, but beset with numerous short-stipitate yellowish capitate glands; hypanthium saucer-shaped or hemispheric, 1- to 3-bracteate at base, at maturity about 3 mm. across, the persistent entire triangular sepals 1.5-2 mm. wide at base, 2-3 mm. long; fruit with membranous wall, laterally (i. e., radially) compressed, biconvex, stipitate, the body about 2 mm. long and 1 mm. deep, the inner angle nearly straight from base of stipe to tip

of the persistent style, the outer one abruptly outcurved at base of style, then gradually attenuate into the stipe; total length, including stipe and style, about 3.5–5 mm.

Southern Mexico and Guatemala; Costa Rica and western Panama; Cordillera Oriental, Colombia; highlands in forested areas.

CHIRIQUI: valley of the upper Río Chiriqui Viejo, P. White 58.

2. HESPEROMELES Lindl.

HESPEROMELES Lindl. in Bot. Reg. sub pl. 1956. 1837; Macbr. in Field Mus. Publ. Bot. 13²:1065–1069. 1938.

Osteomeles auct., quoad pl. Amer.

Eleutherocarpum Schlecht. in Lechl. Berb. Am. Austr. 59. 1857.

Evergreen shrubs or small trees, sometimes depressed and gnarled, often much branched and the young branchlets often spinose-tipped. Leaves simple, variable in size and shape, mostly coriaceous, 3–5 cm. long or less, crenate or dentate. Flowers 5-merous, pink or white, in small terminal corymbose cymes usually exceeded by the leaves; ovary inferior at anthesis, the 5 carpels distinct from each other from the flowering stage on but attached parietally, at maturity with bony endocarp, enlarged and often somewhat exserted from the fleshy hypanthium; ovule 1 (occasionally 2) in each locule; cotyledons accumbent. Fruit a small red, purple or black pome 1 cm. long or less, tipped by the persistent sepals.

Hesperomeles is a genus of somewhat doubtful standing, scarcely morphologically distinct from *Osteomeles*, of which the (Hawaiian and Chinese) species have pinnate leaves but in technical characters agree precisely with the American *Hesperomeles*. The Old World genus *Pyracantha* is evidently very closely akin to *Hesperomeles*, as evidenced by similarities between species of the two groups, but differs in having the carpels regularly bi-ovulate, and the cotyledons incumbent. A hybrid between *Osteomeles subrotunda* and *Pyracantha crenato-serrata* is known (\times *Pyracomeles Vilmorinii* Rehd. ex Guillaumin in Bull. Soc. Nat. Hort. France, VI, 4:191, 198. 1937). Possibly all three of the above genera should be united under the name *Osteomeles* Lindl. (Trans. Linn. Soc. Lond. 13:98. 1821), the oldest name.

About 20 species of *Hesperomeles* have been proposed. These occur in nature at relatively high elevations (mostly above 2000 meters) either in the South American Andes or in the mountains of Panama or Costa Rica. Almost without exception the supposed species have been founded upon leaf characters alone (as witness the names *cordata*, *cuneata*, *escalloniaefolia*, *ferruginea*, *heterophylla*, *latifolia*, etc.). A study of the available herbarium material indicates that no general correlation is possible between leaf characters and those of the inflorescences. The flowers and fruits, inflorescences, types and distribution of pubescence, venation-patterns, and occurrence of spinescent branching are very nearly identical in all

the supposed species within reasonable limits of variation—as nearly identical as would be expected in any genus which had long evolved not in a continuous geographical range but on the series of isolated areas which are the *páramos* and *subpáramos* of the Andes. The differences between the leaves of the supposed species of *Hesperomeles* are correlated in a very general way with habitat and with vigor of the plant itself; in other words the large-leaved plants, which are usually those with most vigorous apical growth of the branches, occur mostly at lower elevations under relatively mild climatic conditions. These differences in leaf characters are doubtless now transmitted genetically, even though they may reflect the effect of environments of past geological periods. Apparently many local races have developed, but as these vary so much as to defy precise definition, as they differ in such trivial ways and are all fundamentally so much alike morphologically, it would seem unwise to dignify them by calling them species, especially since such a course would entail the naming of many more than have already been so treated. A treatment that seems to be more in accord with the biology of the group is to consider most of the plants as belonging to a single wide-ranging species with numerous local races (subspecies, varieties, forms, ecotypes, apomictic strains, or whatever other categories further field study may suggest). These local races are of unknown phylogenetic or systematic position and should not be given formal Latin names until their interrelationships and exact distributions have been worked out.

The Panamanian member of this group is a small-leaved race indistinguishable morphologically from races of the higher Andes in Colombia, Ecuador, Peru, and Bolivia. It appears to be conspecific with the slightly more vigorous and larger-leaved race which was illustrated by Ruiz and Pavón as *Mespilus heterophylla*, and it is treated here as belonging to that species.

1. *HESPEROMELES HETEROPHYLLA* (R. & P.) Hook. Ic. Pl. 9:pl. 846. 1852.

Mespilus heterophylla Ruiz & Pav. Fl. Peruv. 4:pl. 425b. 1802.

Mespilus lanuginosa Ruiz & Pav. loc. cit. 4:pl. 425a. 1802.

Osteomeles obovata Pittier in Contr. U. S. Nat. Herb. 20:108. 1918.

Hesperomeles obovata (Pittier) Standl. in Field Mus. Publ. Bot. 18:480. 1937.

Hesperomeles chiriquensis Woodson in Ann. Mo. Bot. Gard. 26:288. 1939.

Evergreen shrub or small tree up to 5–6 m. high, the smaller forms at higher elevations usually intricately branched, the branches often spinescent; bark on the older branches gray; branchlets reddish-brown with prominent pale lenticels, when young covered with pale or (usually) lustrous reddish-brown hairs about 0.5 mm. long, the hairs contorted at base and curved into a hook or a closed loop, but with their distal ends appressed toward the tips of the branchlets; bark of the branchlets ultimately glabrescent but much roughened by the persistent raised bases of the deciduous hairs; leaves coriaceous, obovate or oblanceolate to elliptic, the blades lustrous and rugose-reticulate above, paler beneath, with a prominulous network of veins, rounded to acute at tips, usually cuneate at base, mostly 1.5–2.5 (–4.5) cm. long and 0.5–1.5 (–2.5) cm. wide, varying from about 2–3 times as long as

wide (on vigorous shoots and especially near tips of branches) to about 1-1.4 times as long as wide (on depressed and much-branched plants with little apical growth, and especially near the bases of branchlets); petioles 1-4 mm. long; stipules subulate, 0.5-0.7 mm. long, early deciduous; blades glabrous or nearly so beneath, often glabrate above but usually with some pale or reddish hairs persistent at least near base in the groove formed by the sunken midvein; margins dentate except near base, with 8-11 low rounded teeth on each edge, the teeth at first tipped with minute glandular processes; flowers in small corymbose cymes terminating the leafy branches, the cymes pubescent and later roughened like the branches, with about 20 flowers or fewer, up to about 3 cm. across, the lower branches up to about 3 cm. long, all the branches bracteate, the bracts like reduced leaves but very narrow, mostly 3-6 mm. long, 0.3-1 mm. wide, very acute at both ends; flowers with a "strong, sweet scent" (E. K. Balls), on pedicel-like cyme-branches 1-3 mm. long, or essentially sessile; petals white or pale pink, or white with pink margins, obovate-oblong, concave, erose-denticulate, glabrous, or pilose on the midline without, rounded at apex (sometimes cuspidate), mostly 3.5-5 mm. long and 3-4 mm. wide, narrowed at base to a stout claw 1 mm. wide; stamens 20, the filaments narrowly triangular, flat, about 1.5-3 mm. long, the anthers pink or rose-colored, about as broad as long, 0.7-1.3 mm. long; disk white- or rufous-tomentose, varying to almost glabrous; styles 5, filiform, 4-5.5 mm. long, distinct to the base but approximate, arising from the inner angles of the carpels, white-pilose for 1-2 mm. at base; stigmas terminal, capitate, about 0.3 mm. across, often slightly oblique; hypanthium in anthesis campanulate or turbinate, 3-5 mm. long, the apex truncate and surmounted by the 5 broad-based calyx-lobes which are 2-3 mm. wide at base, 2.5-4 mm. long, deltoid, or with a subulate tip; hypanthium and calyx-lobes vestite like the branches of the cymes, or the lobes glabrous at least toward tips; fruit red, or nearly black when ripe, globose to oblong, fleshy (in some races said to be edible), glabrescent, up to 1 cm. long, the styles and calyx persistent; pyrenes 4-4.5 mm. long.

Costa Rica and Panama; Colombia and Venezuela to Bolivia; thickets, open hillsides, and páramos, mostly at elevations greater than 2000 meters.

CHIRIQUÍ: Potrero Muleto, Volcán de Chiriquí, *Davidson 1055*; Cerro Pando, valley of the upper Río Chiriquí Viejo, *P. White 43*; Loma Larga to summit, Volcán de Chiriquí, *Woodson, Allen & Seibert 1078*.

3. RUBUS L.

By L. H. BAILEY

RUBUS L. Gen. Pl. ed. 5, no. 557. 1754.

Woody plants, erect or trailing or somewhat climbing, bearing flowers and fruits on canes of the second year; in the first year the growths from the root are called primocanes, and in the second year are known as floricanes when they bear fruit and perish; axes usually bear sharp prickles, and often hairs and stalked

glands; leaves (in the known Panama species) 3-foliate or 5-foliate except sometimes a few of them simple in the inflorescence, frequently more or less persisting until the following year; inflorescence racemiform or paniculiform, axillary and usually terminating the canes, pedicels often lengthening in fruit; flowers perfect and complete (in our species); calyx 5-lobed, sometimes glandiferous; petals 5, distinct; stamens numerous, surpassing the head of many small closely packed pistils; fruit a syncarp composed of small simple coherent drupelets that are either attached as a body to the receptacle (blackberries) or forming a cap (raspberries) that falls intact from the receptacle.

Hundreds of species in many parts of the world, particularly in the North Temperate Zone, in the tropics usually on higher lands and mountains.

The brambles of Panama are not yet fully collected or well understood, and some of the identifications are subject to modification. Good complete specimens are needed to verify the determinations, with both primocane and florican parts from the same plant, together with notes on stature and habit.

- I. *Blackberries*. Fruit (syncarp) composed of drupelets that adhere to receptacle and the aggregation falling as one body or "berry"; drupelets rather large, mostly loosely aggregated; main stems or axes usually angled or furrowed, neither glossy or pruinose.
- a. Axes of canes and inflorescence not hairy or hispid or setose, more or less closely pubescent; fruits pendent..... 1. *R. PANAMANUS*
 - aa. Axes prominently hairy or hispid or setose; fruits erect.
 - b. Canes beset with glandiferous hairs..... 2. *R. PRAECIPUUS*
 - bb. Canes not glandiferous.
 - c. Leaflets abruptly contracted into very narrow apex; canes pubescent but not densely long-hairy; prickles many; clusters very dense..... 3. *R. TANTUS*
 - cc. Leaflets gradually acuminate, somewhat pubescent; canes thickly shaggy; prickles few; clusters open..... 4. *R. TRICHOMALLUS*
- II. *Raspberries*. Fruit a cup of drupelets separating from the receptacle (which remains on the plant); drupelets small, much compacted; main stems or axes usually evenly terete, polished and mostly pruinose..... 5. *R. GLAUCUS*

1. *RUBUS PANAMANUS* Bailey, in Gent. Herb. 6:355. 1944.

Diffuse and scandent; canes whitish-pubescent, with few and scattered hooked prickles; primocane foliage not recorded; florican leaves minutely pubescent on upper surface, pubescent-tomentulose on veins underneath, finely and sharply serrate, 3-foliate or perhaps simple in the inflorescence; leaflets narrow-elliptic, terminal or central one 8-10 cm. long, 4-5 cm. broad, narrowed to long point; flowers a dozen or fewer in axillary and one terminal racemiform open cluster; corolla 1 cm. or less across, white; pistils dark-colored; fruit pendent, about 1 cm. long; drupelets many and closely packed.

Panama.

CHIRIQUÍ: Bajo Chorro, Boquete Distr., 2000 m., Davidson 72.

This plant has been called *R. alpinus* Macf., a species native in Jamaica but not known in Panama.

2. *RUBUS PRAECIPUUS* Bailey, in Gent. Herb. 6:356. 1944.

Large bramble, canes sometimes 5 m. long, densely and finely pubescent and covered with brownish glandular hairs, and bearing scattered broad-based hooked prickles; primocanes not recorded; leaves of floricanes large, minutely hairy on upper surface, softly pubescent underneath, sharply minutely serrate, 3- to 5-foliolate; leaflets oblong-acuminate to elliptic-acuminate, 8-11 cm. long, 4-6 cm. broad; petiole glandular-hairy; inflorescence terminal, panicle-like, 20-30 cm. long, central rachis continuous, glandular-hairy; flowers white to pink, 2-2.5 cm. across; fruit oblong, 2 cm. or less long, very seedy.

Panama.

CHIRIQUÍ: Quebrada Velo, 1800 m. alt., *Woodson & Schery 275*; vicinity of Casita Alta, Volcán de Chiriquí, 1500-2000 m. alt., *Woodson, Allen & Seibert 801, 869*.

3. *RUBUS TANTUS* Bailey, in Gent. Herb. 6:361. 1944.

Upright and stout, canes pubescent but not long-hairy or shaggy, prickles many and recurved, not glandular; leaves somewhat pubescent on upper surface, gray-tomentose on under surface, closely sharply serrate, 3- to 5-foliolate; leaflets ovate to ovate-elliptic, sometimes subcordate, 7-9 cm. long, about 4 cm. broad; petiole pubescent and prickly; inflorescence terminal and short, panicle-like, lateral clusters in upper axils; flowers many, crowded, small, pinkish-white; fruit small, with few drupelets.

Panama.

CHIRIQUÍ: vicinity of El Boquete, 1000-1300 m., *Maxon 5107*; pastures, *Pittier 3127*.

4. *RUBUS TRICHOMALLUS* Schlecht. in *Linnaea* 13:268. 1839.

Vigorous, large, 2 m. high, the canes shaggy brown-hairy but not glandular, closely pubescent on surface, prickles remote and hooked; primocane leaves many and large, puberulent on upper surface, grayish-tomentose on under surface, finely and unevenly sharp-serrate, 3- to 5-foliolate; leaflets narrowly ovate-elliptic-acuminate, 8-10 cm. long, 3-5 cm. broad, sometimes subcordate; petiole stout, hairy-pubescent, aculeate; inflorescence panicle-like and terminal with a few smaller clusters in upper axils, the peduncles brown-hairy and commonly prickly; flowers white, small, about 1 cm. across; fruit small, short-oblong, about 1 cm. long.

Southern Mexico to Panama, but the identity of the Panama plant not yet clear.

CHIRIQUÍ: Cerro Vaca, in forest or thickets, 900-1136 m. alt., *Pittier 5721*; pastures around El Boquete, 1000-1300 m., *Pittier 3139*; vicinity of El Boquete, *Maxon 4927*.
COCLÉ: vicinity of El Valle, *Allen 1189, 1647, 1776*.

5. *RUBUS GLAUCUS* Benth. in *Plant. Hartweg*. 173. 1839. "Black Raspberry."

Diffuse or erect, to 1.5 m. tall; primocanes smooth, glaucous, with uncinat scattered prickles 2-3 mm. long; leaves dull green, glabrous on upper surface, gray-tomentose underneath, minutely serrate, 3-foliolate; leaflets elliptic-ovate to ovate-lanceolate, 6-10 cm. long, long-acuminate, petiole with hooked prickles; flowers mostly solitary, sometimes 2 or 3, in upper axils; corolla white sometimes tinged

Fig. 66. *Rubus praecipuus*

(143)

Fig. 67. *Rubus trichomallus*

green, about 1.5 cm. broad; fruit oblong or thimble-shaped, 1.5 cm. and more long, becoming black, of good quality.

Panama, Colombia, Ecuador.

CHIRIQUÍ: Volcán de Chiriquí, Loma Larga to summit, 2500-3880 m. alt., Woodson, Allen & Seibert 1081; vicinity of Cerro Punta, 1500-2000 m., Seibert 264; llanos de volcán, about 1300 m., Allen 1546; El Boquete, 1000-3000 m., Pittier 3135.

4. *ALCHEMILLA* L.

ALCHEMILLA L. Gen. Pl. ed. 5, 58. 1754; L. M. Perry in Contr. Gray Herb. 84:1-57. 1929.

Alchemilla, sect. *Lachemilla* Focke, in Engl. & Prantl, Nat. Pflanzenfam. 3³:43. 1894.
Lachemilla (Focke) Rydb. in N. Am. Fl. 22:380. 1908.

Perennial herbs, often prostrate or procumbent, often stoloniferous. Leaves alternate, petiolate, usually palmately lobate or cleft, the upper smaller, with fewer lobes or divisions, sessile; stipules sheathing, usually foliaceous, lobed or cleft, adnate to the petiole, the whole often appearing as a multifid perfoliate leaf or a many-lobed sheath. Flowers minute, usually crowded into small axillary or terminal glomerulose cymes, less often in loose racemoid inflorescences; hypanthium persistent, urceolate, the 8-10 lobes 2-seriate, the outer ones smaller; petals none; stamens 1-4, free, opposite the calyx-lobes, the filaments short, usually not more than half the length of the calyx-lobes; disk with thickened margin, nearly closing the mouth of the hypanthium. Fruit of 1-6 achenes, these sessile or stipitate, included in the hypanthium, with basal, ventral, ascending and persistent styles, and capitate or clavate stigmas.

This group of species, whether it be treated as a genus, *Lachemilla*, as done by Rydberg and more lately by Rothmaler (Fedde Rep. Sp. Nov. 42:164-173. 1937), or as a section or subgenus of *Alchemilla*, following Focke, Miss Perry, and more recent American authors including Standley (Field Mus. Publ. Bot. 18:477-478. 1937), and Standley & Steyermark (Fieldiana: Bot. 24:436-440. 1946), is easily recognized in the field, but the individual species are difficult of interpretation. The flowers are very small (3-4 mm. long or less), and in consequence the species have been distinguished chiefly by the use of characters of leaf-shape and lobing, distribution and quality of pubescence, and other vegetative characters which are not always convincing. Miss Perry divided the group as a whole into six easily recognizable series, or species-groups, of which two, the *ORBICULATAE* and the *APHANOIDES*, are represented in Panama.

- a. Basal leaves 5- to 11-lobed or -cleft, the blades relatively broad and merely toothed, even those of the upper leaves much broader than and distinct from the stipules.
- b. Leaf-blades shallowly 5- to 11-lobed..... 1. *A. ORBICULATA*
- bb. Leaf-blades palmately 5- to 9-cleft to near their bases..... 2. *A. PASCUORUM*
- aa. Basal leaves 3- to 5-cleft or -parted, the blades with narrow finger-like lobes, those of the upper leaves often similar to and little exceeding the stipules..... 3. *A. APHANOIDES*

1. *ALCHEMILLA ORBICULATA* Ruiz & Pav. Fl. Peruv. 1:68. 1798.

Alchemilla pectinata HBK. Nov. Gen. & Sp. 6:226. 1824; Perry in Contr. Gray Herb. 84:14. 1929.

Lachemilla orbiculata (R. & P.) Rydb. in N. Am. Fl. 22:381. 1908.

The stolons usually with well-developed leaves bearing offsets or floral shoots in their axils; basal and lower stem-leaves orbicular-reniform, 1.5–4 cm. broad, stiff, deeply cordate, the lobes serrate; blades green and glabrate above, appressed-silky beneath, the surface beneath the silky hairs glaucous with minute waxy particles; petioles sericeous, 3–6 (–20) cm. long; stipules of the upper leaves foliaceous, forming a somewhat tubular sheath, deeply incised, the lobes not spreading nor recurving; inflorescence racemose, often terminal and 4–6 cm. long in Panamanian material seen; flowers relatively large, at maturity 3.5–4 mm. long, densely silky; achenes 2–4.

Since the publication of Miss Perry's revision, American botanists generally have treated *Alchemilla pectinata* HBK. as a species distinct from the South American *A. orbiculata*, which differs in having greatly reduced or scale-like leaves on the stolons, sheathing (not merely amplexicaul) bracts subtending the flowers, and 1–2 (not 4–6) carpels. These differences do not seem to be greater than might be expected in geographically separated races of the same species, and in this case I prefer to accept the judgment of Rydberg, who could usually be depended upon to find differences between species whenever such differences existed.

Central Mexico to Bolivia, at the higher elevations, usually above 2000 meters, in clearings and on the *páramos* of the Andes.

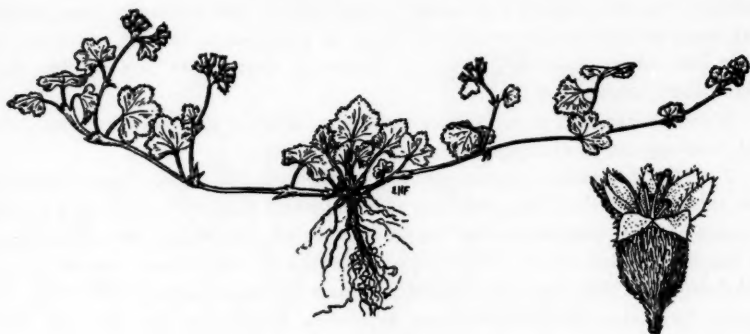
CHIRIQUÍ: Loma Larga to summit, Volcán de Chiriquí, Woodson, Allen & Seibert 1042; Potrero Muleto to summit, Woodson & Schery 401, 438.

2. *ALCHEMILLA PASCUORUM* Standl. Jour. Wash. Acad. 17:310. 1927.

Lachemilla pascuorum (Standl.) Rothm. in Fedde Rep. Sp. Nov. 42:171. 1937.

Basal and lower stem-leaves orbicular-reniform, 2–4 cm. broad, the lobes cuneate-obovate, rounded at apex, incised-dentate above the middle, green and sparingly pilose above, densely to sparsely appressed-silky beneath, the surface beneath the silky hairs glaucous with minute waxy particles; petioles 2 cm. long or less, appressed-pilose; stipules of the upper leaves foliaceous, forming a short sheath, deeply incised, the lobes spreading or recurving; inflorescences compact, in short axillary clusters or racemes 2–4 cm. long; flowers 2–2.5 (–3) mm. long, densely silky; achenes 2–4.

Possibly not to be distinguished specifically from *Alchemilla venusta* Schlecht. & Cham. (of Mexico), *A. guatemalensis* Rothm. (Guatemala), or *Lachemilla fulvescens* (Perry) Rothm. (Colombia). Perry separates *A. venusta* from *A. pascuorum* on the basis of its "villous, turbinate-urceolate" (not "sericeous, globose-urceolate") hypanthium, and its erect to spreading (not erect to subconnivent as

Fig. 68. *Alchemilla pascuorum*

in *A. pascuorum*) calyx-lobes. I find these characters difficult of interpretation and think the species rather too close together.

As pointed out by Perry, *Alchemilla pascuorum* is also closely related to *A. pectinata* (*orbiculata*). All the Panamanian material I have been able to examine falls into two rather well-defined groups, one with relatively large basal leaves often 2.5-3 cm. broad, and a distinct erect terminal racemose inflorescence 4-6 cm. long. The other group has the basal leaves somewhat more deeply divided (but not always to near the base), mostly 1.5-1.8 cm. broad, and the flowers in shorter clusters, 2-4 cm. long, from the axils of the well-developed stolons. The first group, with the larger leaves, undoubtedly represents *Alchemilla orbiculata*. The second I have here called *A. pascuorum*, although at least one of the specimens cited below as this species has been seen by Miss Perry and cited, with some doubt, as *A. pectinata* (Woodson *et al.* 892, cited in *Ann. Mo. Bot. Gard.* 26:287. 1939).

CHIRIQUÍ: Volcán de Chiriquí, Cerro Copete, Allen 4858; Chiquero, Boquete Distr., Davidson 546; Cerro Pando, valley of the upper Río Chiriquí Viejo, P. White 8; Volcán de Chiriquí, Casita Alta, Woodson, Allen & Seibert 892.

3. *ALCHEMILLA APHANOIDES* L. f. Suppl. 129. 1781; Perry in *Contr. Gray Herb.* 84:36. 1929.

Alchemilla hirsuta var. *alpestris* Cham. & Schlecht. in *Linnaea* 5:572. 1830.

Alchemilla subalpestris Rose, in *Contr. U. S. Nat. Herb.* 10:96. 1906.

Lachemilla tripartita (R. & P.) Rydb. in *N. Am. Fl.* 22:383. 1908.

Lachemilla subalpestris (Rose) Rydb. loc. cit. 384. 1908.

Alchemilla aphanoides var. *subalpestris* (Rose) Perry in *Contr. Gray Herb.* 84:39. 1929.

Lachemilla aphanoides (L. f.) Rothm. in *Fedde Rep. Sp.* Nov. 42:170. 1937.

Stems erect to decumbent, subsimple or branched, densely to sparsely pilose; leaves tripartite, the lower more densely pubescent than the upper, the segments oblanceolate to cuneate-obovate, multifid or incised-dentate; stipules foliaceous, 2- to 4-lobed or cleft, often with the sessile upper leaves forming many-lobed or

perfoliate "leaves"; flowers aggregated in small axillary and terminal cymes, usually very short-pedicellate; hypanthium glabrous or nearly so at least at maturity, the outer lobes about equalling the inner; flowers in Panamanian material less than 2 mm. long; achenes 1-3.

Northwestern Mexico to Bolivia; mountains, often at elevations between 2000 and 3000 meters, in clearings and on *páramos*.

The North American representatives of this species have lately been referred to var. *subalpestris*, which has somewhat shorter flowers than the typical variety and is somewhat less pubescent except for the hypanthium, which may be sparsely hairy in the Panamanian plant. *Alchemilla albanoides* is very closely related to *A. sibbaldiaefolia* HBK., but the Central American representatives of the latter are marked by rather strongly pubescent hypanthia, and I have not seen any such from Panama.

CHIRIQUÍ: Volcán de Chiriquí, Potrero Muleto, Davidson 1040; Loma Larga to summit, Woodson, Allen & Seibert 1041; Potrero Muleto to summit, Woodson & Schery 418.

5. ACAENA L.

ACAENA Mutis, ex L. Mant. Pl. 145. 1771; Bitter, in Bibl. Bot. 74:1-336. 1910-1911.

Herbaceous or low suffrutescent plants usually with odd-pinnate leaves, toothed leaflets, and stipules more or less adnate to the petioles. Flowers in spikes or racemes, apetalous, the sepals and stamens variable in number (usually 4); pistil usually 1 with short terminal style and multifid stigma, at maturity forming an achene wholly inclosed in the prickly hypanthium.

1. ACAENA ELONGATA L. Mant. Pl. 200. 1771.

Acaena agrimonioides HBK. Nov. Gen. & Sp. 6:231. 1824.

Plants shrubby at base, often with upright herbaceous branches, about 1 m. high or less, the bark on the older branches exfoliating in very thin reddish-brown sheets; plant ultimately glabrate, but juvenile stems and leaves vestite with loosely appressed silky straight yellowish-white hairs 0.7-1.5 mm. long. Leaflets often 13 (9-19 according to Bitter), the proximal ones much reduced in size, the 7 distal ones all alike (or the terminal one slightly larger), elliptic or oblong to obovate, often 5-8 mm. wide, 10-20 mm. long, acute at each end or obtuse at tips, the two edges very unequal at base, the proximal edge of at least the terminal pair decurrent on the rachis, the petiolules mostly 1-2 mm. long; margins of leaflets rather coarsely crenate-serrate with 6-8 teeth on each edge, the teeth often pilose-tufted; stipules adherent to the rachis, scarious, often reddish-brown, connate at base and forming a sheath 1-2 mm. long about the stem, thence tapering gradually toward tips, the body 5-15 mm. long, the free herbaceous tips linear, entire, 2-6 mm. long; margins of stipules, rachis and sometimes axis of inflorescence with scattered stipitate glands; pubescence of leaf at maturity often reduced to

Fig. 69. *Acaena elongata*

tufts at bases of leaflets, on upper side. Flowers racemously arranged on leafless axillary branches mostly 20–30 cm. long, relatively few (often 8–10) to a branch, each borne on a short lateral bracteate branchlet (up to 1.5 cm. long, or most often 1 mm. long or less) which is bibracteolate at summit and terminated by a pedicel 1–4 mm. long; calyx-lobes 4, green (contrasting with the reddish hypanthium), ovate, acute, about 1 mm. wide and 1.5 mm. long, at anthesis crowning the flower and much exceeding the spines of the hypanthium, but at maturity immersed in the spines; stamens 3–4, purplish, 1–2 mm. long, the anthers reniform, 0.5 (–0.8) mm. long and about 1.2 mm. wide after dehiscence; style very short, tipped by the expanded flattened peltate stigma which is about 1.5 mm. broad, bilateral, the divisions deeply lacerate; hypanthium in anthesis cylindric, reddish, at maturity pendent, broadly ovoid or ellipsoid to globose, 3–5 mm. in diameter and 5–8 mm. long (exclusive of spines), the outer layer inflated, membranaceous, glabrous or puberulent; spines uniformly distributed, spreading, arising from the 10–12 ribs of the hypanthium (about 6 to each rib) which are concealed by the outer inflated layer; visible part of the spines 2–3 mm. long, purplish-red or brown, commonly with 3 retrorsely pointed barbs at apex.

Central Mexico to Guatemala; Costa Rica and Panama; Colombia and Ecuador; open meadows, thickets or wet forests, in highlands, mostly at elevations of 2000 meters or above, sometimes becoming a noxious weed.

CHIRIQUI: valley of the upper Río Chiriqui Viejo, P. White 62.

6. PRUNUS L.

PRUNUS L. Gen. Pl. ed. 5, 213. 1754; Koehne in Engl. Bot. Jahrb. 52:279-333. 1915; Macbride in Field Mus. Publ. Bot. 13²:1083-1090. 1938.

Trees with alternate simple leaves. Flowers (in Panamanian species) white, racemose; calyx 5-lobed, the tube perigynous, cup-like, forming with the receptacular disk the hypanthium bearing the 15-20 stamens and 5 petals at its margin; filaments free, filiform or somewhat dilated at base; carpel 1, with terminal style and peltate or truncate stigma; ovules 2, collateral. Fruit a drupe, one-seeded, often with juicy pulp.

A large genus, best known for the numerous species which are cultivated for food and for ornament. Segregate genera, e. g. *Padus* and *Laurocerasus*, are maintained by some botanists but are based chiefly on characters of the inflorescence and are probably best included in *Prunus*. The native Panamanian species belongs to the Section LAUROCERASUS as defined by Koehne in 1915. This author included 47 species in the section, 42 of them American. At the time of his revisionary studies Koehne was unable, because of lack of material, to integrate the results of his studies in the several distinct floristic areas in tropical and subtropical America, and it is probable that the actual number of species will prove smaller than his estimate. In the area including Mexico and Central America Koehne recognized 7 species, of which he described 5 as new. The characters used by him to distinguish species in the group to which the Panamanian plant apparently belongs (i. e. the species having entire leaves, glabrous petals, solitary racemes, and superficial glands near the base of the leaf blade), appear to be of little value for this purpose. The number of glands on the leaf-blade, which was assumed by Koehne to be constant for a species, varies from 0 to 3 on either side of the midrib of the same leaf, and from 0 to 4 (rarely 6) on different leaves on the same plant. The unusual development of lenticels and the transverse cracks in the branchlets, on which he based *Prunus tuberculata* and *P. annularis*, respectively, do not appear to be constant characters. After study of somewhat more material than was available to Koehne, I doubt that more than one species exists in this group, at least in Central America. The oldest name which is applicable to the species is *Prunus brachybotrya* Zucc. (1837), from Mexico, but pending a revision of the whole group it seems wisest at present to refer the Panamanian plant to a species originally described from nearby Costa Rica, *Prunus annularis*.

Fig. 70. *Prunus annularis*1. *PRUNUS ANNULARIS* Koehne in Engl. Bot. Jahrb. 52:308. 1915.

Large evergreen tree, up to 20 m. tall with trunk up to 50 cm. in diameter, entirely glabrous. Leaves coriaceous, entire, elliptic to lanceolate or ovate, 2.5–5.5 cm. wide, 6–13 cm. long, usually 2–2.5 times as long as wide, rounded at base, narrowed toward the apex from about the middle, with a short blunt acumen; petiole stout, 1–1.5 mm. in diameter, 1–1.5 cm. long; lateral veins often 5–7 pairs, inconspicuous, slender, arcuate-ascending, anastomosing well inside the margin; glands usually present on the lower surface of the blade near base, round or oval, often about 0.5 mm. wide and 0.7 mm. long, 1–2 (rarely none, or 3) on each side of the midrib, mostly 5–10 mm. from the base of the blade and about 5 mm. from the margin, but sometimes as little as 1–2 mm. from base or margin; stipules very soon deciduous, not seen, probably narrowly linear, 2–4 mm. long. Flowers in leafless racemes 4–5.5 (–7) cm. long, these from the axils of the subpersistent leaves of the preceding season; flowers 20–40, subtended by very small chartaceous bracts which are deciduous before the flowers open; pedicels naked, 3–7 mm. long (those at the base of the racemes the longest), 0.5–0.7 mm. in

diameter at anthesis, up to 1.5 mm. in diameter in fruit, mostly at right angles to the axis; petals white, glabrous, entire, rounded or reniform, about 2 mm. long including the short claw, 2–2.5 mm. wide; stamens about 20, glabrous, the filaments 2.5–4 mm. long, subulate; anthers (0.6?–) 0.7–1 mm. long, elliptic; hypanthium in anthesis campanulate, about 3 mm. broad and high, the calyx-lobes broadly triangular, blunt or acute, about 1.5 mm. wide at base, 1 mm. long, entire; hypanthium and calyx deciduous immediately after anthesis; ovary glabrous, about 1.5 mm. long, tipped by the straight style 2–3 mm. long and 0.3 mm. in diameter; stigma peltate, 0.7–0.9 mm. across. Fruit probably a purple ovoid drupe with thin flesh, about 1.5 cm. in diameter, 2 cm. long; stone ovoid, pointed, about 10 mm. in diameter, 13 mm. long; seed globose, about 9 mm. in diameter.

Costa Rica and Panama; related species or perhaps the same species from Vera Cruz and Chiapas through Central America into northern South America; chiefly in rain forests, at elevations from 1000 to 2000 meters.

CHIRIQUÍ: Bajo Chorro, Boquete Distr., *Davidson* 235; between El Volcán and Cerro Punta, *G. White* 14; vicinity of Casita Alta, Volcán de Chiriquí, *Woodson, Allen & Seibert* 907.

Prunus occidentalis Sw., reported from the Volcán de Chiriquí by Seemann (Bot. Voy. Herald, 119. 1852–53), is a West Indian species not known to occur in Panama; the report was doubtless based on what is here called *Prunus annularis*. *Prunus cornifolia* Koehne, a Costa Rican species recognized by having a persistent calyx and tufts of hairs in the axils of the main foliar veins (Sect. NEOCALYCINIA Koehne), was erroneously reported from Panama (Ann. Mo. Bot. Gard. 27:312. 1940), but its known range is from southern Mexico to Costa Rica only. The common half-wild cherry of the highlands of Guatemala and southern Mexico, the *capulín*, *Prunus capuli* Cav., has apparently not been reported from Panama, although it is widely naturalized from Venezuela to Bolivia. It may be recognized by the racemose inflorescence which bears leaves near its base, the crenate-dentate leaves bearing reddish hairs beneath along the midvein, the persistent calyx and the sweet nearly black juicy fruit 1–1.5 cm. in diameter.

7. CHRYSOBALANUS L.

CHRYSOBALANUS L. Gen. Pl. ed. 5, 229. 1754.

A small (possibly monotypic) genus of shrubby plants with entire coriaceous leaves. Flowers white, in axillary cymes; calyx (hypanthium) perigynous, the lobes 5; petals 5; stamens about 20, hirsute, coherent; ovary sessile at the bottom of the hypanthium; ovules 2; style basal. Fruit a drupe with one bony stone having 5–6 angles.

1. CHRYSOBALANUS ICACO L. Sp. Pl. 513. 1753; Hook. f. in Mart. Fl. Bras. 14²:7. 1867.

Low shrub 1–2 m. high, or prostrate, or a medium-sized tree up to 5–6 m. high, glabrous or essentially so except in the inflorescence and on very young

Fig. 71. *Chrysobalanus Icaco*

growth, where strigose; bark of the branchlets reddish-brown, smooth except for the very numerous and conspicuous pale lenticels. Leaves varying considerably from one plant to another, elliptic to obovate or suborbicular, rounded or emarginate at apex or when elliptic narrowed to an obtuse apex, cuneate to acute or rounded at base, up to about 8 cm. long and 6 cm. wide, (1-) 1.5-2 times as long as wide, on stout petioles 2-4 mm. long; blades dark green and lustrous above, dull beneath and usually with a depressed elliptic glandular area about 0.5 mm. long on each side of the midrib at extreme base; small veins prominently reticulate on both sides of the blade, the primary lateral veins mostly 4-6 pairs, straight at base but curving and anastomosing before reaching the margins. Flowers white, in short-peduncled axillary cymes shorter than the leaves (mostly 2-4 cm. long, with 8-20 flowers), the cyme-branches often strongly flattened and 1-1.5 mm. wide, often glabrescent near the base, the tips densely pale-strigose like the hypanthium, the flowers and the tips of the cyme-branches appearing silvery white to the unaided eye; cymes usually naked in anthesis, the ovate, acute, finely glandular-ciliate bracts 1.5-2 mm. long but very soon deciduous; petals 5, glabrous, oblanceolate or spatulate, 3-5 mm. long, 2-3 times as long as wide, the tips rounded, often erose, the bases cuneate; stamens about 20 (up to 30, according to Hooker) in one series, the filaments pale (?white), about 5 mm. long or less, hirsute on the inner surface except on the distal third, the flattened bases coherent a third or half the length of the filaments into a cylinder; anthers about 0.5 mm. long, ?pink or ?purplish; hypanthium campanulate or turbinate, at anthesis about 3 mm. long and wide, the inner surface hairy, the long-hirsute ovary sessile at the bottom of the tube, the filiform style 6-7 mm. long, hirsute except at tip, erect, with a minute terminal stigma; calyx-lobes triangular-ovate, acute or blunt-tipped, heavily pubescent, the margins glandular-ciliate but otherwise entire. Fruit globose or oval, 2-5 cm. long, white to pink or purple, edible, with white juicy insipid flesh, the stone 1-2 cm. long with 5-6 acute longitudinal ribs.

Tropical America, from Florida and Tamaulipas southward through the West Indies and Central America to northern Brazil and to Ecuador; tropical West Africa; near sea level, in beach thickets and coastal swamps; often planted inland.

BOCAS DEL TORO: Nances Cay, vicinity of Chiriquí Lagoon, *von Wedel 2936*. CANAL ZONE: Aspinwall, *Hayes 636*; Chagres, *Fendler 107*. COCLÉ: Penonomé, *Williams 400*. COLÓN: Manzanillo Island, *Hayes 709*. PANAMÁ: San José Island, [*Johnston, Erlanson*].

8. LICANIA Aublet

LICANIA Aubl. Hist. Pl. Guian. Fr. 119, *pl. 45*. 1775; Hook. f. in Mart. Fl. Bras. 14²:8-19. 1867; Fritsch, in Ann. K. K. Naturhist. Hofmus. Wien 4:33-60. 1889.

Moquilea Aubl. loc. cit. 521, *pl. 208*. 1775; Hook. f. in Mart. Fl. Bras. 14²:19-26. 1867; Focke in Engl. & Prantl, Nat. Pflanzenfam. 3³:58. 1894.

Trees with alternate simple entire leaves. Flowers usually paniculate, the ultimate branchlets cymosely branched; hypanthium globose or campanulate, the lobes 5; petals 5, minute or none; stamens 3 to many, inserted at the margin of the hypanthial disk, often connate at base, forming a complete ring or unilaterally disposed; ovary unilocular, sessile at the bottom of the hypanthium, hairy; style basal; fruit drupaceous, various, one-seeded, the pericarp usually leathery or woody.

- a. Leaves tomentose beneath with fine white or nearly white appressed tomentum.
- b. Leaves broadly rounded at apex, obtuse or (usually) subcordate at base, mostly 1.4-1.7 times as long as wide; branchlets stout, often 3-6 mm. thick at base of inflorescence; stamens about 20..... 1. *L. ARBOREA*
- bb. Leaves acute or acuminate at apex, acute to rounded at base, mostly 2-2.7 times as long as wide; branchlets at base of inflorescence slender, 1-2 mm. thick; stamens 3 (sometimes in addition to a few vestigial rudiments)..... 2. *L. HYPOLEUCA*
- aa. Leaves glabrous or essentially so..... 3. *L. PLATYPUS*

1. *LICANIA ARBOREA* Seem. Bot. Voy. Herald, 118, *pl. 25*. 1852-53.

Licania Seleriana Loes. Verh. Bot. Ver. Brandenb. 53:55. 1911.

Tree to 10 m. tall (or sometimes up to 30 m., according to Standley) with broad stiff blunt, oval or oblong leaves; juvenile foliage, branchlets and inflorescence conspicuously yellowed, very densely hirsutulous with short erect or somewhat matted tawny hairs; branches and upper surface of mature leaves glabrate, the lower leaf-surfaces strongly whitened with a closely felted tomentum; branchlets stout, often 3-6 mm. in diameter at the base of the inflorescence, the bark reddish-brown with inconspicuous pale lenticels. Leaf-blades coriaceous, ovate to elliptic or oblong, broadly rounded at apex, obtuse or (usually) subcordate at base, 5-12 (-15) cm. wide, 6-18 (-25) cm. long, usually 1.4-1.7 times as long as wide, lustrous and glabrous above; lateral veins about 12-15 pairs, widely divergent, the 3-5 proximal pairs much closer together than the others, all raised and forming conspicuous ribs on the lower surface; petioles stout, 5-10 mm. long, 2-3 mm. in diameter; stipules 1-1.5 cm. long, 1-2 cm. wide, linear, acute, appressed, on shoots

only. Flowers essentially sessile, very many together in axillary and terminal panicles at the tips of branches, forming an inflorescence often up to 40–50 cm. long and nearly as broad, with widely divergent branches; petals white, hirsute, oblanceolate or obovate, often about 1.5–2 mm. long and half as wide, obtusely pointed at apex, cuneate at base; stamens about 20 (the anther-bearing ones 10 or fewer), the filaments up to about 3 mm. long, hirsute, their bases coherent into a cylinder and inserted with the calyx, the sterile ones often short and inconspicuous; anthers about 0.5 mm. long; hypanthium deeply cup-shaped, about 1.5–2 mm. wide and high in anthesis, tomentose within, usually contracted toward apex and surmounted by the 5 erect or converging calyx-lobes which are triangular, acute, about 1–1.5 mm. wide and long; ovary sessile at the bottom of the hypanthium, nearly globose, about 1 mm. long, hirsute; style about 2.5 mm. long, subulate, hirsute except for the distal 0.5 mm. which is slender, terete, and glabrous; stigma terminal, slightly flattened. Fruit (said by Seemann to be black) obovoid or oblong-obovoid, 2–3 cm. long or larger, rounded at tip, substipitate, glabrate.

Western Mexico (Guerrero) to Panama, lowland, often in dry brushy forest; Colombia.

CANAL ZONE: Chiva-Chiva trail, Red Tank to Pueblo Nuevo, *Piper* 5713, 5738; old Las Cruces trail between Fort Clayton and Corozal, *Standley* 29089. COCLÉ: north rim of El Valle de Antón, *Allen* 1741; Penonomé and vicinity, *Williams* 338. CHIRIQUÍ: David, *Pittier* 2841. PANAMÁ: Sabanas, *Bro. Paul* 290; Corozal road near Panamá, *Standley* 26847; Matías Hernández, *Standley* 28952; between Matías Hernández and Juan Díaz, *Standley* 32007.

The large seed of this species is said to contain about 30 percent of oil, and to burn readily. The oil is similar to that produced commercially from the seeds of a closely related species, *Licania rigida* Benth., of Brazil. The type specimen of *Licania arborea* was collected by Seemann between Tolé and David, in what is now the Province of Chiriquí.

2. LICANIA HYPOLEUCA Benth. Bot. Voy. Sulphur, 91, pl. 32. 1844.

Tree 10–15 m. tall, with a trunk-diameter of 10–40 cm., the ovate or lanceolate pointed leaves whitened beneath, the branchlets slender (1–2 mm. thick at the base of the inflorescences), nearly black, glabrate (in the juvenile state densely sordid-puberulent). Leaves ovate to lanceolate or elliptic, the upper surface lustrous and glabrous but the veins and veinlets in fully mature leaves marked with lines of tiny closely set papillae, the lower surface (appearing glaucous to the unaided eye because of the fineness of the tomentose layer) whitened with a dense appressed tomentum, the main lateral veins densely puberulent or thinly tomentose, arcuate, 6–8 pairs, prominent beneath, inconspicuous above (in dried material); blades acute to acuminate at tips, acute to rounded at base, 5–12 cm. long, 2–5 cm. wide, usually about 2–2.7 times as long as wide; petioles stout, about 1 mm. in diameter and 4–7 mm. long, densely short-hairy, the hairs on the upper side extending 2–4 mm. in a narrow inverted V onto the base of the blade; stipules subulate, 1–3 mm. long, subper-

sistent, erect and parallel to the branchlets. Flowers (said to be white) very small, numerous in leafy, terminal, mostly pyramidal panicles 10–20 cm. long; lower (axillary) branches of the panicle widely divergent, often 6–15 cm. long, most of the flowers borne in racemoid arrangement along secondary branches in 2- to 5-flowered cymules on peduncles 2–5 mm. long; terminal flowers of the cymules often pedicellate 1–3 mm., the lateral ones usually nearly sessile; corolla none; anther-bearing stamens usually 3 (opposite 3 adjoining calyx-lobes), less than 1 mm. long, the filaments subulate, dilated at base and hirsute about the zone of insertion, the anthers about half as long as the filaments; hypanthium campanulate or turbinate, about 1.5–2 mm. long and wide in anthesis, often contracted slightly at mouth, surmounted by the 5 ovate-acute, entire calyx-lobes which are spreading at tips, about 1 mm. long and wide; receptacle thickly hairy within, with a prominent fringe of hairs at the somewhat thickened margin, which in addition often bears short sterile filaments alternating with the calyx-lobes, and less often bears very short vestigial filaments elsewhere; ovary sessile at the bottom of the hypanthium, ovoid-globose, less than 1 mm. long, white-hirsute; style erect (in the flower opposite the stamens and so alternating with the stamenless calyx-lobes), about 2 mm. long, subulate, hirsute except for the slender tip 0.2–0.3 mm. long; developing ovary elongating at base and becoming stipitate at maturity. Fruit pyriform, red, thinly pubescent at least at base, about 1 cm. thick and 2 cm. long (including the attenuate base).

Tabasco and British Honduras to Panama, lowland, in wet or moist forests; Colombia?

The TYPE of this species came from "Veragua", according to Bentham's original description; in Seemann's "Flora of the Isthmus of Panama", published a decade after Bentham's description, the locality was given as "Province of Veraguas", the implication being that no more definite locality could be given. At this period Veraguas included all of what is now the Province of Chiriquí, so the type-locality of this species may have been almost anywhere along the Pacific Coast of western Panama. The species is reported by Standley (Contr. U. S. Nat. Herb. 27:189. 1928) from Barro Colorado Island, with the notation that this is the only locality at which it is known to occur in the Canal Zone.

CANAL ZONE: Barro Colorado Island, Standley 31323, 31416, 41067. DARIÉN: La Palma, Pittier 5491.

3. *LICANIA PLATYPUS* (Hemsl.) Fritsch in Ann. K. K. Naturhist. Hofmus. Wien 4:53. 1889; Pittier in Contr. U. S. Nat. Herb. 13:443, pl. 86. 1912; Standl. & Steyerl. in Fieldiana Bot. 24:456. 1946.

Moquilea platypus Hemsl. Diagn. Pl. 1:9. 1878; Biol. Centr.-Am. Bot. 1:366. 1880.

Tree up to 50 m. high with large, narrow, glabrous, somewhat distichous leaves; branchlets stout, glabrous, purplish or red, often 2–3 mm. in diameter at the base of the inflorescence, the lenticels numerous, narrowly elliptic, 0.5 mm. long; leaf-blades coriaceous, elliptic-lanceolate or narrowly oblong, rounded grad-

Fig. 72. *Licania platypus*

usually to a short-acuminate tip, rounded or acute at base, 3-6 (-8) cm. wide, 10-30 cm. long, usually 3 times as long as wide, green and somewhat lustrous above, paler and somewhat glaucous beneath; midvein raised and rather prominent beneath; lateral veins 12-20 (-25) pairs, arcuate, anastomosing near the margin; lower surface of the blade bearing small oval or circular glands 0.2-0.3 mm. across, these 0.2-1.5 mm. from the margin, slightly sunken, rimmed, one near the end of each main lateral vein; petioles dark red (when dry), 9-15 mm. long, 2 mm. in diameter; stipules dark, erect, stiff and persistent, 2.5 mm. long, adnate to the petiole three-fourths their length, the tip free, rounded. Flowers white, fragrant,

subsessile or on pedicels 1–2 mm. long, very many together in axillary and terminal cano-tomentose panicles at the tips of branches, these forming a divaricately branching inflorescence 10–35 cm. long; panicle branches strongly flattened near base, bractless at flowering time; petals obovate, 2–3 mm. long, finely white-tomentulose distally (often said to be ciliate); stamens 15 (–18), glabrous, subequal, the filaments up to 3 mm. long, inserted separately on the margin of the thickened disk, which is heavily retrorsely bearded; anthers about 0.5 mm. long; hypanthium cup-shaped, about 1.5 mm. high and 2 mm. wide in anthesis, tomentulose without, silky within, the erect or spreading calyx-lobes obtusely triangular with rounded sides, about 1.3 mm. long and wide; ovary sessile at the bottom of the hypanthium, nearly globose, about 1 mm. long, hirsute; style 5–6 mm. long, subulate, hirsute except for the distal one-third which is terete, filiform. Fruit (according to Pittier) very large, 1–3 to each panicle, 15–20 cm. long, 10–14 cm. in diameter, with dark brown, verrucose skin covered with white lenticels, and the inside flesh yellow, juicy, and sweet, somewhat fibrous; seed usually one, ovate-oblong, flattened, 6–8 cm. long, 4–4.5 cm. in largest diameter.

Southern Mexico to Panama; reported from Colombia. In lowland forests, often at elevations less than 400 meters, often cultivated for ornament.

PANAMÁ: along Río Juan Díaz above Juan Díaz, *Allen 941*.

This species is reported from San José Island by Johnston (*Sargentia* 8:132. 1949), who gives at the same time a good descriptive account of the tree as it occurs in the forest on the island.

The native country of this tree is somewhat in doubt; Pittier remarks that he has never seen it in a truly wild state. Hemsley's original material included a cultivated specimen from Nicaragua (designated as the type-specimen in *Contr. U. S. Nat. Herb.* 23:344. 1922), and Cuming's *No. 1272*, originally supposed to have come from Panama (i. e. probably western Panama). As Hemsley later pointed out (*Biol. Centr.-Am. Bot.* 1:366. 1880), "Cuming's specimens may have been collected further south, in Western Colombia." (i. e. probably what is now eastern Panama).

9. *HIRTELLA* L.

HIRTELLA L. *Gen. Pl.* ed. 5, 20. 1754; Hook. f. in *Mart. Fl. Bras.* 14²:27–40. 1867; Standl. & Steyerl., in *Fiediana*, *Bot.* 24⁴:450–452. 1946.

Shrubs or trees with alternate, simple, entire leaves. Flowers in axillary and terminal panicles or racemes; hypanthium short and symmetrical or elongated and then usually gibbous, the lobes 5, reflexed; petals 5; stamens 3–7 (rarely more), inserted at the summit of the hypanthium disk, usually unilaterally inserted (i. e. on the side where the ovary is attached, opposite the style and the enlarged side of the hypanthium); ovary unilocular, hirsute, attached to the side of the hypanthium-tube above the base (i. e. below the base of the middle stamen); style basal. Fruit drupaceous, often dry.

- a. Inflorescence racemoid, the 30-40 flowers on unbranched filiform bracteolate pedicels 5-8 (-12) mm. long; stamens 5-7..... 2. *H. RACEMOSA*
- aa. Inflorescence a leafless spike-like panicle, the lateral branches (cymes) often 1.5 cm. long, the spikes sometimes appearing racemoid when most of the cymes are reduced to 2 or even 1 flower each; stamens 3.
- b. Leaves glabrate or the principal veins with persistent appressed yellowish hairs; bracts of the cymes lanceolate, attenuate, minutely glandular-denticulate..... 3. *H. TRIANDRA*
- bb. Leaves sparsely or densely short-hirsute, at least on the veins, with erect rufous or tawny hairs; bracts of the cymes round or oval, heavily beset with depressed or stalked and peltate glands 0.3-1 mm. across..... 1. *H. AMERICANA*
1. *HIRTELLA AMERICANA* L. Sp. Pl. 34. 1753; Standl. & Steyererm. in Fieldiana, Bot. 24:450. 1946.

Hirtella mollicoma HBK. Nov. Gen. & Sp. 7:263. 1825; Hemsl. in Biol. Centr.-Am. Bot. 1:366. 1880, as *mollissima*; Standl. in Contr. U. S. Nat. Herb. 27:188. 1928.

?*Hirtella glandulosa* Spreng. Anleit., pl. 7, f. 1-4; Neue. Endt. 1:303. 1820; DC. Prodr. 2:528. 1825; Seem. Bot. Voy. Herald, 118. 1852-53.

Hirtella guatemalensis Standl. in Trop. Woods 11:19. 1927.

Small or medium-sized tree, the branchlets and inflorescences conspicuously rufous, densely short-hirsute with straight, slender, multicellular tawny hairs 0.5-0.7 mm. long; branchlets 2-4 mm. in diameter below the inflorescence, the hairs persistent. Leaves hairy like the stems but less densely, the upper surface glabrate in age except the midrib, the lower surface densely hairy on the principal veins and uniformly but sparsely so on the anastomosing veinlets, where the hairs are often about 3 times as long as the distance between them; hairs of the leaves with enlarged papillose bases; leaf-blades thick and subcoriaceous, oblong or elliptic, acute and gradually short-acuminate at apex, rather abruptly rounded or obtuse at base, 3-6 cm. wide, 6-15 cm. long, often 2-2.7 times as long as wide; lateral veins 8-12 pairs, arcuate, slightly impressed above, raised beneath, the small veinlets finely reticulate and often raised on the upper surface, making it rough to the touch; glands abundant on the lower surface, usually concentrated near base and apex of the blade, elliptic or circular, 0.2-0.5 mm. across, with raised rim and depressed center; petioles very stout, 2-4 mm. long and about 2 mm. thick, their surfaces concealed by the hairs; stipules subpersistent, hirsute, subulate, appressed, 6-9 mm. long. Flowers many, white or purplish-white, in very narrow spike-like leafless panicles 10-20 cm. long and 2-4 cm. thick, the lateral branches of the spike often about 1.5 cm. long, ascending, cymosely 1- or few-flowered; bracts of the cymes round or oval, 1-1.5 mm. long, heavily beset with large glands, these varying from depressed spots 0.3 mm. across to peltate glands 1 mm. across on stalks 1 mm. long, the larger glands often very numerous and conspicuous in the spikes after the abortion of most of the flowers; bracts subtending the lateral cymes (i. e. those of the main axis) eglandular or nearly so, hirsute, subulate, about 5 mm. long; petals white, broadly elliptic, bluntly rounded at base and apex, glabrous, about 4 mm. long and 3 mm. wide; stamens 3, opposite adjoining sepals, much exerted and curled into the flower, purplish or deep red, glabrous, the fila-

ments 1-1.2 cm. long, fleshy at base and tapering to the very slender tips, arising separately from the hypanthium-rim which is fleshy and projects about 1 mm. or a little less above the base of the calyx; anthers about 0.6 mm. long; hypanthium turbinate, the cavity funnellform, about 2 mm. deep measured from the summit of the fleshy rim, retrorsely hairy within the rim but glabrous at bottom; calyx-lobes broadly oblong, obtuse to rounded at tips, reflexed at and after anthesis, entire, 1.5-2.2 mm. wide, 2-2.7 mm. long, the outer surface thinly yellow-hirsute like the inflorescence, the inner surface pale, sordid-tomentulose; ovary hairy, sessile, attached above the middle of the hypanthium cavity (at the base of the middle stamen), the style about as long as the stamens and opposite them in the flower, filiform, long-pilose below the middle, with tiny capitate stigma, in bud bent abruptly away from the ovary and then coiled toward it. Fruit oval, thinly yellow-hairy, rounded at apex, probably 1-1.5 cm. long or longer, black.

Cuba; British Honduras, Costa Rica, and Panama; Colombia and northern Venezuela; thickets and savannas, lowlands.

A distinct entity, but probably the same species, occurs in Guatemala and southern Mexico; the pubescence in general is toward yellowish rather than reddish, the calyx-lobes are sordid-tomentulose and pale on the outer surface as well as the inner, and the glands are usually absent from the lower leaf-surfaces but are usually present on the upper.

CANAL ZONE: Gatuncillo, *Piper* 5654; between Río Grande and Pedro Vidal, road to Arraiján, *Pittier* 2708; [Cruces, *Seemann*]; southwest of Pt. Salud, Barro Colorado Island, *Woodworth & Vestal* 728. COCLÉ: Penonomé, *Williams* 247. PANAMÁ: Chorrera, *Killip* 3409; Pacora, *Bro. Paul* 284; Sabanas, north of Panamá, *Bro. Paul* 412; San José Island, *Erlanson* 108.

2. *HIRTELLA RACEMOSA* Lam. *Encycl. Meth.* 3:133. 1789; DC. *Prodr.* 2:529. 1825; Seem. in *Bot. Voy. Herald*, 119. 1852-53; Standl. & Steyerl. in *Fieldiana, Bot.* 24:450-452. 1946.

Hirtella americana Aubl. *Hist. Pl. Guian. Fr.* 247, pl. 98. 1775; Hook. f. in *Mart. Fl. Bras.* 14:333. 1867; Benth. in *Bot. Voy. Sulphur*, 91. 1844; Standl. in *Contr. U. S. Nat. Herb.* 27:188. 1928; auct. *Amer. plur.*, non L.

Hirtella oblongifolia DC. *Prodr.* 2:529. 1825.

Shrub or small tree, 2-3 (-6) m. tall, with slender pubescent branchlets 1-1.5 mm. in diameter below the inflorescence; hairs of two types, those of the young foliage and branchlets yellowish, appressed or erect, straight and slender, pointed, multicellular, 0.5-1.5 mm. long, these also abundant in the inflorescence but there mixed with tiny erect white hairs mostly 0.2-0.3 mm. long. Leaves elliptic to oblong, lanceolate, or ovate, glabrate, only a few long yellow hairs persistent on the veins (at least of the lower surface), a few of the hairs with papillose bases; blades subcoriaceous, lustrous, 1.5-4 cm. wide, 3-8 cm. long, usually 2-3 times as long as wide, narrowed from the middle or above to a broad blunt or pointed acumen 1 cm. long or less, narrowed and rounded at base (or obtusely narrowed, with the extreme base rounded abruptly into the petiole); petiole short, stout, about 0.7

mm. in diameter, 2 mm. long; lateral veins 6-8 pairs, arcuate, slightly raised on both surfaces but not forming conspicuous ribs on either, often hardly visible on the upper; glands occurring on the lower surface of the blade near base, mostly nearly circular, about 0.2 mm. across, with raised rim and depressed center; stipules subsistent, filiform-subulate, appressed-hairy, 2.5-5 mm. long, usually black in dried material, appressed to the branchlets. Flowers in axillary and terminal racemes 12-15 cm. long (or up to 20-25 cm. including the basal leafy part of the growing branchlet terminated by the raceme); "racemes" 30- to 40-flowered, flowering from base to apex but apparently always determinate, the terminal (bractless) flower abortive; lateral flowers on filiform "pedicels" 5-8 (-12) mm. long, spreading at right angles or somewhat ascending, each with two tiny bracteoles near base or about one-third the distance from base to apex, the bracteoles often with sessile or stalked glands on the margins, and borne at the summit of a thickened peduncular portion of the flower-stalk (only the part beyond them being the pedicel proper); bracts subtending the flower-stalks lanceolate, usually recurved, 1-2 mm. long, with basal marginal glands like those of the leaves (and sometimes a similar gland at apex); petals pink, purple or "rosy mauve", glabrous, broadly elliptic, rounded at both ends, 2-3 mm. wide, 3-5 mm. long; stamens 5-7, much exserted, purple, glabrous, the filaments 1.2-1.6 cm. long, fleshy at base and tapering to the very slender tips, arising separately from the fleshy hypanthium-rim which projects 1 mm. or less above the base of the calyx, absent from the segment of the rim opposite the insertion of the ovary or there represented by vestigial staminodia only; anthers about 0.6 mm. long; hypanthium in anthesis elongate-tubular, with hollow cylindric or oblong one-sided base up to about 1 mm. thick and 2 mm. long, and funnelform throat about 1 mm. long, the interior hairy about the summit of the throat, glabrous below; calyx-lobes oblong or elliptic, usually reflexed at anthesis, entire, rounded or subacute at apex, about 1-1.5 mm. wide, 2.5 mm. long, the outer surface with mixed short white and long yellow hairs, the inner surface glabrous proximally, distally white-tomentulose; ovary hirsute, sessile, attached to one side of the funnelform portion of the hypanthium above the bottom; style as in *H. americana*, but up to about 1.5 cm. long, arising from the flower toward the side where functional stamens are lacking (i. e. the side toward which the inflated base of the hypanthium is expanded). Fruit oblong-obovoid, sparsely hairy, dark red or purple, up to about 1.5 cm. long and 0.6 cm. in diameter, rounded at apex, the base substipitate.

Guerrero and British Honduras to Panama, northern South America, and south in the Amazon Basin to central Brazil, eastern Peru and eastern Bolivia; lowlands, in forests and thickets.

CANAL ZONE: Summit Road, D. G. Jones 277; Ancón Hill, Piper 5575, 5596; Pittier 2075; between Miraflores and Corozal, Pittier 2192; between Corozal and Ancón, Pittier 2641; road to Arraiján, between Río Grande and Pedro Vidal, Pittier 2702; Ancón Hill, Standley 26366; Corozal, Standley 27371; Gamboa, Standley 28370; Summit, Standley 30107; Obispo, Standley 31742; Río Chagres, Steyermark & Allen 17500; Barro Colorado Island, Wetmore & Abbe 105; Woodworth & Vestal 332. COCLÉ: Penonomé, R. S.

Williams 91. COLÓN: vicinity of Santa Rosa, Río Gatuncillo, Allen 4156. DARIÉN: La Palma, Pittier 5486. PANAMÁ: Río Las Lajas, Allen 1603; Las Sabanas, Killip 3361; Macbride 2645; La Chorrera, Bro. Maurice 816; Isla Taboga, Miller 2035; Standley 27036, 28017; Tumba Muerto road near Panamá, Standley 29736. PROVINCE UNKNOWN: "Panamá", Duchassaing in 1850.

According to Johnston (Sargentia 8:131-132. 1949), the true *Hirtella racemosa* is a South American species with larger flowers than the Panamanian and Central American species, which he refers to *H. oblongifolia* DC. Under the name of *H. oblongifolia*, he reports the species as a very common shrub on San José Island.

3. *HIRTELLA TRIANDRA* Sw. Prodr. Veg. Ind. Occ. 51. 1788.

Large shrub or a tree, often 5-6 m. high (sometimes to 20 m. with a trunk 15-20 cm. in diameter), with slender pubescent branchlets 1-2 mm. in diameter below the inflorescences; inflorescences and juvenile foliage and branchlets more or less appressed-pubescent with two types of hairs intermingled: straight, slender, pointed, yellow or tawny, usually appressed hairs 0.5-1 mm. long, and straight or crisped often erect white hairs 0.3 mm. long or less; the longer, yellow hairs predominating on the leaves, while in the inflorescence the two types are often equally intermingled except on the inner surfaces of the calyx-lobes, where the shorter, white hairs alone occur. Leaves elliptic or sometimes oblong, glabrate or the principal veins persistently hairy, the hairs of the leaves often with enlarged papillose bases; blades rather thin, 2-5 cm. wide, 6-12 (-15) cm. long, 2-3 times



Fig. 73. *Hirtella triandra*

as long as wide, rather abruptly acute at apex and with a definite narrow sharp-pointed acumen 0.6–2 cm. long; base of blades acutely narrowed from below the middle, the extreme base not decurrent but often abruptly rounded and so truncate or even subcordate, and sharply delimited from the stout petiole 1–2 mm. thick and 2–4 mm. long; lateral veins 5–8 pairs, arcuate, not very prominent, slightly elevated on the lower surface; glands occurring on the lower surface of the blade (occasionally on the upper surface), mostly near base, often very small, 0.2 mm. across, but sometimes reaching 0.5 mm., elliptic or circular, with raised rim and depressed center; stipules subpersistent, hirsute, subulate, appressed, 3–5 mm. long. Flowers in axillary and terminal raceme-like panicles 3–7 cm. long, the "racemes" compound but the lateral cymes most often reduced each to 1 or 2 flowers and the inflorescence giving the appearance of a simple raceme with bracteolate pedicels 8–15 mm. long (actual pedicels 2–3 mm. long); bracts of the cymes lanceolate, attenuate, minutely glandular-denticulate, 1.5–3 mm.; petals white, broadly elliptic, rounded at both ends, about 5 mm. long and 3–3.5 mm. wide, glabrous; stamens 3, opposite adjoining sepals, much exserted, pink or purple, glabrous, the filaments 1.2–1.6 cm. long, fleshy and about 1 mm. wide at base and tapering to the very slender tips, arising separately from the hypanthium-rim which is fleshy and projects about 0.5 mm. above the base of the calyx; anthers about 0.6 mm. long; hypanthium campanulate, the cavity funnelliform, about 1.8–2 mm. deep, retrorsely hairy within the fleshy rim but glabrous at bottom; calyx-lobes oblong to suborbicular, rounded at tips, reflexed after anthesis, entire, 2–2.5 mm. wide, 3–3.5 mm. long, the outer surface with long yellow appressed hairs and scattered small white hairs also, the inner surface white-tomentulose; ovary hirsute, sessile; style as in *H. americana*, but up to 1.5 cm. long. Fruit dark red or purple, oblong-obovoid, up to 2.3 cm. long and 15 mm. thick, with rounded apex and thick, short, stipe-like base, rather densely yellow-hairy.

West Indies; British Honduras and Guatemala to Panama; northern South America and south in the Amazon basin to southern Brazil, eastern Peru and eastern Bolivia; low and middle elevations, in moist or wet forests.

BOCAS DEL TORO: Fish Creek hills, *von Wedel* 2457. CANAL ZONE: Barro Colorado Island, *Bangham* 398; *Salvoza* 865; *Wetmore & Abbe* 198; *Woodworth & Vestal* 647; *Frijoles*, *Pittier* 2680; along Río Indio de Gatún, *Pittier* 2784; Fort Sherman, *Standley* 31135. COLÓN: along Río Fató, *Pittier* 3869; Santa Isabel, *Pittier* 4178. DARIÉN: El Real, *Allen* 967; Garachiné, *Pittier* 5523; Pinogana, *Pittier* 6577; Cituro, R. S. Williams 667. PANAMÁ: hills above Campana, *Allen* 1689; Pacora, *Allen* 3453; near Vigía and San Juan on Río Pequeni, *Dodge, Steyermark & Allen* 16524; near Chepo, *Kluge* 48; Río Tataré, *Woodson & Schery* 1008. ?SAN BLAS: Permé, *Cooper* 286; Marraganti [*?Mazar-gandi*], R. S. Williams 1000.

10. COUEPIA Aublet

COUEPIA Aubl. Hist. Pl. Guian. Fr. 519, pl. 207. 1775; Hook. f. in Mart. Fl. Bras. 14²:40–49. 1867.

Trees or shrubs, with alternate, simple, entire leaves. Flowers in racemes or panicles; hypanthium elongate and somewhat tubular, often gibbous at the base,

the lobes 5; petals usually 5; stamens 10-15 or numerous, inserted at the summit of the hypanthium tube, the filaments more or less united at base in a complete or incomplete ring; ovary unilocular, hairy, attached to the side of the hypanthium-tube above the base. Fruit a dry or fleshy drupe, the stone mostly woody, 1-seeded.

1. *COUEPIA PANAMENSIS* Standl. in Trop. Woods 42:22. 1935.

Tree up to 20 m. tall, nearly glabrous, the petioles, young growth, and inflorescence sparsely strigose with appressed sordid hairs 0.5 mm. long or less, the inner calyx-lobes canescent-puberulent near tips; branchlets dark reddish brown, glabrescent, about 2 mm. thick below the inflorescence, the lenticels inconspicuous. Leaves ovate or elliptic, the tip acute and terminated by a blunt acumen about 1-1.3 cm. long and 2-4 mm. wide, the base of the blade acute and attenuate into a stout petiole 1.5-2 mm. thick and 4-6 mm. long; petiolar glands elliptic, near summit of petiole, about 1.5-1.8 mm. long, with raised margin and a flat sunken central area; similar but much smaller glands (about 0.5 mm. long) occur at intervals along the margins of the blades, especially near tips; blades 3-5 cm. wide, 8-12 cm. long, 2-2.5 times as long as wide, lustrous on both surfaces when dry, the veins inconspicuous, arcuate, about 5-6 pairs, those near apex usually anastomosing and not forming well-marked ribs; stipules not seen. Flowers "greenish to pale white", in small terminal panicle-like clusters 6-8 cm. long; petals fleshy, glabrous, strongly concave (at least in bud; open flowers not seen), broadly elliptic, rounded at apex and base, about 4 mm. wide and 5 mm. long; stamens about 20, mostly antheriferous, the filaments glabrous, about 6 mm. long in bud, their bases coherent into an incomplete ring, the anthers about 1 mm. wide and long; hypanthium long-campanulate, in bud about 3 mm. in diameter and 5-6 mm. long, attenuate to a pedicel 5-8 mm. long, enlarged at apex into the 5 fleshy and strongly imbricate suborbicular entire calyx-lobes which are about 4 mm. long; receptacle funnelform and densely woolly within, the cavity 2-3 mm. deep, the basal half of the hypanthium lignified, the hirsute ovary 1 mm. or less above the bottom of the cavity; style about 3 mm. long in bud, the stigma white, peltate, flattened, about 1 mm. across. Fruit not seen.

SAN BLAS: Permé, Cooper 279.

CONNARACEAE

Trees, shrubs, or woody lianas. Leaves alternate, imparipinnate, rarely unifoliate, exstipulate; leaflets entire. Inflorescence paniculate, terminal or lateral. Flowers relatively small, regular, perfect or rarely dioecious; sepals 5, imbricate to valvate, free or rarely connate at the base, sometimes accrescent in fruit (*Rourea*); petals 5, free or connate at the base; stamens 10, the filaments united toward the base and in alternate cycles of two lengths, the longer opposite the sepals, the shorter (sometimes staminodial) opposite the petals; carpels free, 5-1, but usually

producing a single fruit, the ovules 2 in each carpel, collateral, erect, anatropous, basal or sub-basal. Fruit a follicle, sometimes indehiscent, or a legume, containing usually a single arillate seed.

- a. Carpels 5; follicles sessile.
 - b. Sepals valvate, not enlarged in fruit; follicles densely ferruginous-tomentose; leaves densely and persistently pubescent..... 1. CNESTIDIUM
 - bb. Sepals imbricate, enlarged in fruit; follicles and leaves glabrous or glabrate..... 2. ROUREA
- aa. Carpels 1; follicles stipitate, essentially glabrous; leaves glabrous or glabrate..... 3. CONNARUS

1. CNESTIDIUM Planch.

CNESTIDIUM Planch. in *Linnaea* 23:439. 1850; Schellenb. in *Engl. Pflanzenreich* IV. 127 (Heft 103):191. 1938.

Woody lianas. Leaves imparipinnate. Inflorescence paniculate, pseudoterminal in the axils of the upper leaves. Flowers small, eglandular, subsessile; sepals valvate, not enlarged in fruit; carpels 5. Follicles almost always solitary, sessile, very densely ferruginous-tomentose without, containing a single arillate seed.

In addition to the following species, one other occurs in the Guianas.

- 1. CNESTIDIUM RUFESCENS Planch. in *Linnaea* 23:440. 1850.

Rourea frutescens Aubl. ex Griseb. in *Bonplandia* 6:6. 1858.

Rourea bondurensis Donn. Sm. in *Bot. Gaz.* 40:2. 1905.

Woody lianas as much as 12 m. high, sometimes attaining the proportions of a slender tree. Leaves large, with 7-9 oblong to obovate-oblong leaflets 3-9 cm. long which are persistently ferruginous-pubescent, particularly beneath. Flowers subsessile, numerous, in densely ferruginous-pubescent, pseudoterminal panicles 10-15 cm. long; sepals about 3 mm. long; petals white, very slightly longer than the sepals. Follicles sessile, densely ferruginous-tomentose, 1.0-1.5 cm. long, 5-7 mm. broad.

Moist or swampy forests and thickets from sea-level to about 120 m.; common in most of Panama; southern Mexico to Colombia; Cuba.

CANAL ZONE: Barro Colorado Island, *Sbattuck* 1038, 1127; *M. Brown* 96, 121; *Starry* 137; *Woodworth & Vestal* 399; *Van Tyne* s. n.; *Standley* 41000; *Bangham* 403; drowned forest near Vigía and San Juan, on Río Pequeni, alt. 66 m., *Steyermark & Allen* 16572; vicinity of Miraflores Lake, *G. White* 167; near Cruces, *Hayes* 936; Frijoles, *Piper* 5834; *Allen* 925; near Fort Randolph, *Standley* 28679; along old Las Cruces Trail between Fort Clayton and Corozal, *Standley* 29028, 29139; near Summit, *Standley* 29592, 30090; vicinity of Fort Sherman, *Standley* 31087; Obispo, *Standley* 31744; Gamboa, *Stevens* 1111; between France Field, C. Z., and Catival, Province of Colón, *Standley* 30172. CHIRIQUÍ: vicinity of San Felix, alt. 0-120 m., *Pittier* 5740. COCLÉ: between Aguadulce and the Chico River, *Pittier* 5104; Penonomé and vicinity, *Williams* 186. BOCAS DEL TORO: Water Valley, *von Wedel* 895. PANAMÁ: Punta Paitilla, *Piper* 5429; between Pacora and Chepo, *Woodson, Allen & Seibert* 1645; Camino del Boticario, near Chepo, *Pittier* 4553; near Matías Hernández, *Standley* 28953; Río Tecúmen, *Standley* 29432, 29443; Cerro Campana, *Allen* 2681; Tumba Muerto Road near Panamá, *Standley* 29741; San José Island, *Erlanson* 560; Taboga Island, *Barclay* s. n.; *G. S. Miller* 1842; *Standley* 27985.

2. ROUREA Aublet

ROUREA Aubl. Hist. Pl. Guian. Fr. 1:467. 1775; Schellenb. in Engl. Pflanzenreich IV. 127 (Heft 103):194. 1938.

Robergia Schreber, Gen. 1:309. 1789.

Malbrancia Necker, Elem. Bot. 2:366. 1790.

Eicbleria Progel, in Mart. Fl. Bras. 12²:518. 1877.

Woody lianas, sometimes nearly erect shrubs or trees. Leaves imparipinnate, rarely unifoliate, when pinnate the lateral leaflets usually approximate or alternate rather than strictly opposite. Inflorescence terminal, pseudoterminal, or lateral, paniculate, usually more slender and with fewer flowers than in the two other genera. Flowers small, usually distinctly pedicellate; sepals imbricate, conspicuously enlarged in fruit, sometimes glandular; carpels 5. Follicles almost always solitary, sessile, glabrous or essentially so, containing a single arillate seed.

A genus of the American tropics containing about 32 species according to Schellenberg. The plants normally are woody lianas, but in the absence of suitable support may become erect or nearly so.

- a. Calyx glandular, tomentose.
 - b. Flowers yellowish green; sepals 3-4 mm. long; leaflets 6-17 cm. long, densely tomentulose beneath..... 1. R. PITTIERI
 - bb. Flowers white; sepals 1.5-2.0 mm. long; leaflets 3-10 cm. long, very inconspicuously puberulent to glabrate beneath..... 2. R. ADENOPHORA
- aa. Calyx eglandular, glabrous or inconspicuously ciliolate; leaflets 4-12 cm. long, glabrous..... 3. R. GLABRA

1. ROUREA PITTIERI S. F. Blake, in Bull. Torrey Bot. Club 50:274. 1923.

Woody lianas. Leaves imparipinnate, leaflets 5-7, broadly elliptic, apex subcaudate-acuminate, rarely obtuse, 6-17 cm. long, 3.5-8.5 cm. broad, glabrous above, densely tomentulose beneath. Sepals 3.5-4.0 mm. long in flower, 4.5-5.0 mm. in fruit, glandular and densely tomentulose without; petals yellowish green, 4-5 mm. long. Follicles about 1.5 cm. long, glabrous.

Panama, in moist thickets and forests, ascending to about 700 m. altitude.

COLÓN: Loma de la Gloria, near Fató (Nombre de Dios), *Pittier 4247*. DARIÉN: foothills of Garagará, Sambú basin, *Pittier 5613*; Cana-Cuasi Trail, Chepigana Distr., *Terry & Terry 1536*.

2. ROUREA ADENOPHORA S. F. Blake, in Bull. Torrey Bot. Club 50:273. 1923.

Woody lianas. Leaves imparipinnate, leaflets 3-7, rarely 1, broadly oval to rather narrowly oblong-elliptic, apex narrowly subcaudate-acuminate, rarely obtuse, 3-10 cm. long, 1.5-5.0 cm. broad, glabrous above, very inconspicuously puberulent to glabrate beneath. Sepals 1.5-2.0 mm. long in flower, 3.5-4.0 mm. in fruit, glandular and finely pilosulose without; petals white, about as long as the sepals. Follicles about 1.5 cm. long, glabrous or glabrate.

Panama, in moist thickets and forests at altitudes near sea-level.

CANAL ZONE: vicinity of Frioles, *Piper 5812*; near mouth of Río Chagres, *Allen 887*; vicinity of Summit, *Standley 30102*; between Gatún and Lion Hill, *Pittier 2566*; near Old

Fort Lorenzo, mouth of Río Chagres, *Piper* 5976; Santa Rita Trail, *Cowell* 111; Barro Colorado Island, *Standley* 40971; *Bangham* 487; hills west of Canal, near Gatún, *Standley* 27216. CHIRIQUÍ: forests around Puerto Remédios, *Pittier* 3380.

3. *ROUREA GLABRA* HBK. Nov. Gen. & Sp. 7:41. 1825.

Connarus glaber DC. Mem. Soc. Hist. Nat. Paris 2:385. 1825.

Robergia glabra (HBK.) Spreng. Syst. 4²:188. 1827.

Rourea oblongifolia Hook. & Arn. Bot. Beechey Voy. 283. 1836.

Santalodes glabrum (HBK.) O. Ktze. Rev. Gen. Pl. 1:155. 1891.



Fig. 74. *Rourea glabra*

Woody lianas. Leaves imparipinnate, leaflets 3-5, elliptic to oval, apex subcaudate-acuminate to obtuse, 4-12 cm. long, 2-6 cm. broad, glabrous. Sepals 2-3 mm. long in flower, 4-5 mm. in fruit, eglandular, glabrous or inconspicuously ciliate; petals white, 5-6 mm. long. Follicles about 1.5 cm. long, glabrous.

Southern Mexico to southern Brazil; Cuba and Jamaica. In Panama a frequent liana in moist thickets and forests at lower elevations.

CANAL ZONE: near Fort Randolph, *Standley 28686*; Gamboa, *Stevens 1094*; Ancón Hill, *Standley 26381*; Chagres, *Fendler 57*; vicinity of Salamanca Hydrographic Station, Río Pequeni, *Woodson, Allen & Seibert 1556*; between France Field, C. Z., and Catival, Province of Colón, *Standley 30180*. COCLÉ: Penonomé and vicinity, *Williams 149*. PANAMÁ: between Matías Hernández and Juan Díaz, *Standley 32016*; near the big swamp east of the Río Tecúmen, *Standley 26703*; Paitilla, *Bro. Heriberto 208*; Isla Taboga, *Woodson, Allen & Seibert 1533*.

3. CONNARUS L.

CONNARUS L. Sp. Pl. 2:675. 1753; Schellenb. in Engl. Pflanzenreich IV. 127. (Heft 103):216. 1938.

Omphalobium Gaertn. Fruct. 1:217. 1788.

Thysanus Lour. Fl. Cochinch. 1:284. 1790.

Canicidia Vell. Fl. Flum. 4:pl. 139. 1827.

Erytbrostigma Hassk. in Flora 25:Beibl. 2:45. 1842.

Anisostemon Turcz. in Bull. Soc. Nat. Mosc. 2:152. 1842.

Tricholobus Bl. Mus. Bot. Lugd. Bat. 1:236. 1850.

Woody lianas, shrubs, or trees. Leaves imparipinnate, rarely unifoliate. Inflorescence paniculate, terminal and lateral in the upper leaf axils. Flowers small, glandular; sepals imbricate to subvalvate, more or less conspicuously punctate-glandular, not enlarged in fruit; petals glandular or eglandular; stamens 10, or the inner whorl reduced to staminodia, the filament and connective bearing small, sessile or stipitate glands; carpels 1. Fruit a stipitate, gibbous follicle containing a single arillate seed.

About 121 species of the tropics of both hemispheres, according to Schellenberg. In Panama the species are woody lianas, occasionally erect or suberect, inhabiting moist forests and thickets at low elevations.

- a. Inflorescence densely and persistently ferruginous-tomentulose, the flowers sessile or subsessile; leaflets usually 3, 6-20 cm. long..... 1. *C. PANAMENSIS*
- aa. Inflorescence inconspicuously pilosulose to glabrate, the flowers shortly but definitely pedicellate.
 - b. Leaflets usually 5, broadly oval to oblong-elliptic, broadly obtuse to rounded at the base, 3-12 cm. long..... 2. *C. TURCZANINOWII*
 - bb. Leaflets usually 3, oblanceolate, rather narrowly cuneate at the base, 10-25 cm. long..... 3. *C. WILLIAMSI*

1. CONNARUS PANAMENSIS Griseb. in Bonplandia 6:6. 1858, non Turcz.

Connarus haemorrhoeus Karst. Fl. Columb. 2:73. 1866-69.

Connarus Cookii Pittier, ex Schellenb. in Engl. Pflanzenreich IV. 127. (Heft 103):223. 1938, nom. nud. in synonym.

Woody lianas, sometimes erect or suberect. Leaflets usually 3, rarely 5, elliptic to oval, broadly obtuse at the base, 6-20 cm. long, 2-10 cm. broad on flowering or

fruiting branches, sometimes larger on vegetative stems, ferruginous-tomentulose to glabrate. Inflorescence densely and persistently ferruginous-tomentulose, spicate-paniculate, the small yellowish flowers sessile or subsessile. Sepals ovate, about 1.5 mm. long; petals about 2.5 mm. long. Follicles obliquely compressed-obovoid, about 1.5 cm. long and 1 cm. broad, with a stipe about 3-4 mm. long.

Costa Rica to Colombia.

CANAL ZONE: Barro Colorado Island, *Standley* 31425; *Woodworth & Vestal* 426; *Starry* 207; *Bailey* 224; *Bangham* 399, 418; *Aviles* 10; Cerro Gordo, near Culebra, *Pittier* 2314; Rio Agua Salud, near Frijoles, *Piper* 5862; vicinity of Pacora, *Allen* 1008; along Rio Tecúmen, north of Chepo Road, *Hunter & Allen* 230; Rio Tapia, *Standley* 28212; Isla Taboga, *Woodson, Allen & Seibert* 1449; San José Island, *Erlanson* 85. CHIRIQUÍ: Remédios and vicinity, *Pittier* 5470. COCLÉ: Penonomé and vicinity, *Williams* 376; between Paso del Arado and Olá, *Pittier* 5010.

2. *CONNARUS TURCZANINOWII* Triana, in *Ann. Sci. Nat.* V. 16:364. 1872.

Connarus panamensis Turcz. in *Bull. Soc. Nat. Mosc.* 22:277. 1859, non Griseb.

Woody lianas, sometimes becoming erect or suberect. Leaflets usually 5, broadly oval to oblong-elliptic, broadly obtuse or rounded at the base, 3-12 cm. long, 1.5-5.0 cm. broad on flowering or fruiting branches, glabrate or glabrous. Inflorescence inconspicuously pilosulose to glabrate, the small greenish white or yellowish flowers shortly but definitely pedicellate; sepals narrowly lanceolate, 2.0-2.5 mm. long; petals about 5 mm. long. Follicles obliquely compressed-obovoid, about 1.5 cm. long and 1 cm. broad, with a stipe about 2-3 mm. long.

Apparently endemic to Panama.

CANAL ZONE: Chagres, *Fendler* 128; Gatún, *Hayes* 166, 545; vicinity of Frijoles, *Piper* 5797, 5832; near Fort Randolph, *Standley* 28603; Barro Colorado Island, *Bailey & Bailey* 322; between France Field, C. Z., and Catival, Province of Colón, *Standley* 30273. COLÓN: Aspinwall [Colón], *Hayes* 633, 639.

It is noteworthy, perhaps, that the cited specimens of *C. Turczaninowii* are all from the Atlantic slopes of the isthmus, while those of *C. panamensis* are from the Pacific slope, with the exception of the plants from Barro Colorado Island.

3. *CONNARUS WILLIAMSII* Britton, in *N. Am. Fl.* 22⁶:560. 1918.

Connarus Allenii Steyermark, in *Ann. Mo. Bot. Gard.* 28:430. 1941.

Woody lianas, sometimes erect or suberect. Leaflets usually 3, sometimes 5, oblanceolate, rather narrowly cuneate at the base, 10-25 cm. long, 2-8 cm. broad on fruiting branches, glabrous or glabrate. Inflorescence rather inconspicuously pilosulose to glabrate, the small flowers shortly but distinctly pedicellate; sepals 2-3 mm. long; petals 4.0-4.5 mm. long. Follicles obliquely compressed-obovoid, about 1.5 cm. long and 1.3 cm. broad, with a stipe 3-4 mm. long.

Apparently endemic to Panama.

DARIÉN: Marraganti and vicinity, *Williams* 1006; trail between Pinogana and Yavisa, *Allen* 249.

LEGUMINOSAE

Herbs, vines, shrubs or trees of exceedingly diverse habit and habitat, frequently armed (most frequently in the subfamily MIMOSOIDEAE). Leaves alternate, trifoliate, pinnate or bipinnate or rarely simple, usually large, sometimes sensitive (folding at night or upon disturbance); petiole and rachis prominent or infrequently nearly obsolete, typically pulvinate basally, usually sulcate on the upper side and often (MIMOSOIDEAE particularly) bearing one or more glands; leaflets many or few, as a rule small, almost invariably with the margins entire, commonly oblique basally, pubescent or glabrous, the venation prominent or obscure; stipules and usually stipels present. Inflorescence axillary or terminal, indeterminate, the flowers solitary or more commonly in racemes, panicles, spikes or heads; floral bracts usually present but inconspicuous. Flowers typically, but not always, perfect, complete and 5-merous, regular, sympetalous and valvate (the great majority of the MIMOSOIDEAE) or more commonly irregular, polypetalous and imbricate (CAESALPINOIDEAE and PAPILIONOIDEAE); calyx usually synsepalous and campanulate, sometimes of separate sepals, frequently pubescent; corolla funnellform (most MIMOSOIDEAE), slightly irregular and with the upper petal to the inside (CAESALPINOIDEAE), or papilionaceous (strongly irregular with the upper standard outside the wings and keel: PAPILIONOIDEAE); stamens usually 10 (most PAPILIONOIDEAE) to many (most MIMOSOIDEAE), sometimes few (some CAESALPINOIDEAE), except in the CAESALPINOIDEAE and a few genera of other subfamilies the filaments united below; anthers bilocular, small or large, sometimes gland-bearing, in a few genera dehiscing by terminal pores; ovary unicarpellate and 1-celled, bearing 1 to many ovules from the dorsal suture, usually oblong and compressed, stipitate or sessile, surmounted by a prominent, simple style and usually a small stigma. Fruit a legume, but this extremely variable in size and shape, dehiscent or in a number of cases indehiscent, the seeds typically exalbuminous and bean-like.

The Leguminosae is an exceedingly large and diverse family, well represented in both the tropics and temperate regions (MIMOSOIDEAE and CAESALPINOIDEAE largely tropical). In spite of its inordinate size and perhaps consequent diversity, the family is quite "natural" and is seldom confused with other families. Some exceptions can be found to almost any defining characteristic, but most useful are the usually compound, alternate, stipulate leaves, flower form, and unicarpellate ovary with dorsally affixed ovules becoming in fruit a legume. The floral differences in the three subfamilies are striking and clear-cut for the large majority of genera, so that ample justification can be had for division of the Leguminosae into three families, the Mimosaceae, Caesalpinaceae, and the Papilionaceae or Fabaceae. Many of the world's most important and useful plants hail from the Leguminosae. In the tropics their importance perhaps exceeds that of even the Gramineae (cereal grains, etc.). Aside from supplying timber, food, ornamentals, drugs, poisons, insecticides, resins, shade and ground cover, the Leguminosae are noted for the

peculiar symbiotic relationship of nitrifying bacteria on the roots which makes them very useful for soil improvement.

In many tribes generic differences are exceedingly obscure and undependable, while in others they are sharply marked. Parallel evolution among genera and a multitude of exceptions to the characters on which they are based make it nearly impossible to form simple yet infallible keys. In the keys to the genera of Leguminosae in Panama an effort has been made to avoid obscure characters and those not likely discernible in herbarium material. It is fully realized that some of the distinctions will not always hold when species and genera outside the range of the flora are considered, nor can use of legume characteristics as the sole distinction be avoided in every case.

KEY TO THE SUBFAMILIES

- a. Flowers regular, valvate (rarely imbricate) in bud, usually sympetalous; stamens frequently many and long-exserted, giving a delicate "fluffy" appearance to the head or spike; leaves twice-pinnate except in *Inga* and a few species of *Pithecolobium*..... MIMOSOIDEAE
- aa. Flowers irregular, imbricate in bud, polypetalous, petals unequal; stamens typically 10 or fewer, mostly briefly exserted or not exserted, rarely in heads or "fluffy" spikes; leaves twice-pinnate only in a few genera.
 - b. Upper petal within the others in bud; flowers not papilionaceous; stamens usually free; leaves sometimes twice-pinnate (CAESALPINIEAE)..... CAESALPINOIDEAE
 - bb. Upper petal exterior in bud; flowers typically papilionaceous; stamens except in one tribe united below; leaves never twice-pinnate..... PAPILIONOIDEAE

Subfamily MIMOSOIDEAE (Mimosaceae of many authors)

Trees, shrubs, vines or herbs, variously armed or unarmed. Leaves twice-pinnate (except for *Inga* and a few species of *Pithecolobium* in which the leaves are once-pinnate), usually large, in most genera bearing a gland or glands on the petiole and/or rachis, in some genera sensitive (folding at night or when disturbed), the pinnae normally opposite; leaflets large and few or more frequently small and numerous; petiole usually conspicuously pulvinate. Inflorescence commonly of axillary, pedunculate heads, umbels or spikes, these often borne subterminally from non-foliate nodes and hence constituting a terminal raceme or panicle, usually colorful and ornamental. Flowers usually small, densely clustered, commonly 5-parted, regular, usually complete, rarely imperfect, sessile or less frequently pedicellate, often fragrant; calyx synsepalous, valvate in bud or rarely imbricate, usually small, sometimes minute; corolla sympetalous or polypetalous, usually exceeding the calyx, ordinarily valvate; stamens few or many, free or united, long-exserted, usually the most conspicuous and colorful part of the flower; anthers minute to moderate, gland-tipped or eglandular; ovary 1-carpellate, mostly symmetrical, free, stipitate or sessile, glabrous or pubescent, the style simple and about equalling the stamens. Legume very variable, flat and thin to fleshy and torulose, variously dehiscent or rarely even indehiscent.

A distinctive subfamily well represented in the tropics, especially in the New World. Many genera are nearly pantropical and only a few are confined to either

the Old or New Worlds. A number of species are large trees of ornamental and economic importance. Other species are pestiferous armed weeds. The MIMOSOIDEAE as a whole are usually distinguishable without difficulty by the "fluffy" heads or spikes of clustered, regular flowers with long-exserted stamens.

Most genera of the MIMOSOIDEAE are extremely difficult taxonomically. Parallel evolution, omnipresent variability, and repeated intergradation are the rule rather than the exception. As a result, numerous segregate genera have at various times been proposed, which can scarcely serve any practical purpose. It is difficult enough to recognize the traditional genera of Willdenow and Bentham without including *ad infinitum* the many possible segregable "genera" usually based upon a single difference (this typically in the legume and uncorrelated with distinctive vegetative or floral characters). Such segregates cannot be adequately separated in a key to the genera. It is perhaps significant that the best-versed students of the group, preeminently Bentham, have refrained from inordinate segregation and dependence upon legume characteristics. Willdenow had established legume characters as primarily definitive of most genera, and indubitably such characters are valuable taxonomically. Yet they would seem to have been overstressed. Ample collections of specimens in fruit (seldom sufficient from the tropics, as most specimens of the usually meagre collections consist of flowering material alone) seem to present the intergradation and variability commonly met with in this subfamily.

The outstanding work on the MIMOSOIDEAE is Bentham's classical "Revision of the Suborder Mimoseae" (Trans. Linn. Soc. 30:335-664. 1875), and his treatment of the subfamily for Martius' 'Flora Brasiliensis.' More recent work in the group has been carried on by Ducke, Pittier, Taubert, and others, in a number of publications, while floristically the MIMOSOIDEAE have been treated for North America by Britton and Rose (N. Am. Fl. 23:1-194. 1928), for Colombia by Britton and Killip (Ann. N. Y. Acad. Sci. 35:101-157. 1936), for Peru by Macbride (Field Mus. Publ. Bot. 13:1-113. 1943), and for Guatemala by Standley & Steyermark (Fieldiana: Botany 24:1-88. 1946). In spite of this generous attention a great deal of uncertainty still exists and a need for monographic study of the genera is evident.

- a. Stamens united into a short or long tube, usually many, rarely (viz. *Enterolobium*) as few as 10; flowers generally rather large, the sym-petalous corolla frequently 4-5 mm. long or longer.
- b. Leaves once-pinnate, 2-ranked; flowers whitish..... 1. INGA
- bb. Leaves twice-pinnate (except few species of *Pithecolobium* which then have the leaves few-ranked), mostly few-ranked; flowers sometimes white or cream but often pink.
- c. Either the petiole or rachis or both gland-bearing (the gland sometimes obscure in *Albizia*); legume various but not elastically dehiscent from above.
- d. Petiolar glands lacking or borne only at the apex of the petiole at or just below insertion of the pinnae; legume relatively slender and thick, often torulose, rarely septate, usually dehiscent and pulpy, the seeds usually longitudinal; corolla usually more or less tubular and greatly exceeding the calyx..... 2. PITHECOLOBIUM
- dd. Petiole bearing a gland or glands (except obscure in *Albizia*

- carbonaria*), these usually near or below the middle; legume flat and thin but moderately broad, indehiscent or tardily dehiscent, scarcely pulpy, the seeds transverse; corolla (except few species of *Pithecolobium*) funnellform, usually only about twice as long as the calyx.
- e. Legume circinate to arcuate, somewhat fleshy, septate or falsely septate; pinnae and leaflets many (leaflets 10-60 pairs per pinna); leaflets shorter than 4 mm. or longer than 8 mm., or if 5-7 mm. long the midvein nearly central.
- f. Legume about 1 cm. wide, arcuate or somewhat coiled and twisting in dehiscence, falsely septate; leaflets 5-10 mm. long, the costa nearly central; flowers, where known, essentially glabrous; 2 or 3 species only..... 2. *PITHECOLOBIUM*
- ff. Legume 2 or more cm. wide, circinate or reniform, coiled into a complete or nearly complete circle, septate; leaflets shorter than 4 or longer than 8 mm., the costa excentric; flowers tomentulose..... 3. *ENTEROLOBIUM*
- ee. Legume straight or nearly so, thin and dry, not septate; pinnae and leaflets usually fewer (leaflets less than 10 pair per pinna except in 2 species, these with leaflets 5-7 mm. long, their midveins excentric)..... 4. *ALBIZZIA*
- cc. Petiole and rachis both eglandular; legume elastically dehiscent from above.
- d. Inflorescence capitate; stamens many..... 5. *CALLIANDRA*
- dd. Inflorescence spicate; stamens 5 plus 5 staminodia..... 16. *PENTACLETHRA*
- aa. Stamens free or united only at the extreme base, except in *Acacia* 10 or fewer; flowers generally rather small, the corolla sympetalous or polypetalous and usually considerably less than 5 mm. long.
- b. Herbs, vines, shrubs or trees, seldom aquatic or of swamp habitat; all flowers visibly similar; stems generally lenticellate or armed; legume various.
- c. In Panama inflorescence capitate or very short-spicate (except few species of *Acacia* which then have large, hollow, stipular spines); anthers eglandular (rarely glandular in *Acacia*).
- d. Petals more or less united (divided almost to base in species of *Acacia* with pedicellate flowers); anthers minute (fraction of a mm. long); flowers usually very small; plants frequently armed.
- e. Unarmed or armed, the armament frequently of stipular spines; stamens usually more than 10; petiole and rachis frequently glandular, without nodular apicules; legume unarmed..... 6. *ACACIA*
- ee. In Panama stems armed with scattered, recurved thorns (except sometimes *M. pusilla*); stamens few, usually 10 or fewer, petiole and rachis eglandular but commonly with nodular apicules; legume usually aculeate.
- f. Legume flat, oblong or broad, transversely articulate (in Panama); lower flowers of head rarely unisexual; pinnae and leaflets various but often not as below..... 7. *MIMOSA*
- ff. Legume terete or turgid, usually narrowly linear, continuous; lower flowers of head unisexual; pinnae few to several rather remote pairs, with many leaflets..... 8. *SCHRANKIA*
- dd. Petals free; anthers comparatively large (usually $\frac{1}{2}$ -1 mm. long); flowers small; plants unarmed.
- e. In Panama small shrubs or subherbs; stipules setiform, subpersistent; heads with fewer, erect flowers, the peduncular torus little expanded; legume scarcely 5 mm. wide..... 10. *DESMANTHUS*
- ee. Large shrubs or trees; stipules ovate or caducous; heads orbicular, from an expanded peduncular torus; legume almost 20 mm. wide..... 11. *LEUCAENA*
- cc. In Panama inflorescence elongate-spicate; anthers gland-bearing, at least in bud.
- d. Leaves and inflorescences on condensed short-shoots; petals pilose within; stems with "nodular" spines..... 12. *PROSOPIS*

- dd. Lacking short-shoots; petals glabrous; armament, if any, of scattered thorns.
- e. Trees or shrubs; leaflets less than 15 mm. long, numerous; legume not breaking transversely.
- f. Leaflets mostly alternate; legume indehiscent, unarmed..... 13. *STRYPHNODENDRON*
- ff. Leaflets mostly opposite; legume dehiscent; unarmed or aculeate.
- g. Usually aculeate; petiole usually glandular; calyx-lobes valvate; flowers with 10 stamens, lacking staminodia; legume smaller, thinner..... 14. *PIPTADENIA*
- gg. Unarmed; petiole eglandular, calyx-lobes imbricate; flowers with elongate staminodia and 5 stamens; legume large, ligneous..... 16. *PENTACLETHRA*
- ee. Large vine-like plants, often tendriled; leaflets longer than 15 mm., few; legume valves eventually breaking into segments..... 15. *ENTADA*
- bb. Herbs or subshrubs, of swampy habitats or even free-floating; lower flowers of head with large, petaloid staminodia, visibly quite different from upper perfect flowers; stems unarmed, not lenticellate; legume short, broad, flat, unarmed, glabrous..... 9. *NEPTUNIA*

1. *INGA* Scop.

INGA Scop. Introd. Hist. Nat. 298. 1777.

Amosa Neck. Elem. 2:459. 1790, fide Dalla Torre & Harms.

Torealia Nor. in Verh. Batav. Gen. 5, Art. IV. 4. 1790, fide Dalla Torre & Harms.

Ingaria Raf. Sylva Tellur. 119. 1838.

Feuillées O. Ktze. Rev. Gen. Pl. 1:182. 1891, in part.

Unarmed trees or shrubs, the branchlets usually pubescent when young and noticeably lenticellate. Leaves of moderate size to very large, 2-ranked, simply compound, the leaflets 2-many pairs; petiole usually short, only rarely alate; rachis short or elongate, unwinged or alate, almost invariably bearing subcupuliform, sessile or less frequently stipitate glands between insertion of the petiolules; leaflets entire, rather small to very large, frequently pubescent, the veins normally prominent below; stipules mostly caducous; petiolules short. Inflorescence of 1 to few pedunculate spikes from the axils, or paniculate by insertion of spikes from terminal or subterminal defoliate nodes; peduncular portion of spikes elongate to almost obsolete, the floriferous portion elongate and lax to condensed and clavate, capitate or umbellate; pedicels prominent in only a few species; bracts usually inconspicuous, caducous or subsistent. Flowers white or whitish, regular, perfect, typically Mimosaceous; calyx cupular or tubular, very small to quite large, frequently pubescent, 5-toothed; corolla sympetalous, tubular or funnelform, short and small to very elongate, usually pilose without, 5-lobed; stamens many, exceeding the corolla, the filaments united below into a staminal tube; ovary glabrous or pubescent; style elongate, usually equalling or slightly exceeding the stamens, sometimes capitellate. Legume from short and flat to elongate and subterete, glabrous or pubescent, the margins frequently prominent.

Distribution: New World tropics and subtropics; center of distribution apparently northern South America.

Few genera exhibit the variability found in *Inga*, and the difficulty in organizing the species into groups or workable keys. Sections originally proposed by

Bentham and followed by later authors often fail to hold with the accumulation of additional species and especially more material of many problematical or only partially known species. It seems rather futile to try to retain clear-cut sections within the genus at the present time, and a "natural" key must be sacrificed to a large extent so that certain "artificial" distinctions may make it workable. Thus winging of the leaf rachis may not be a fundamental distinction, being possessed by or lacked by closely related species; but yet no character seems as usable for primary breakdown of the genus. Likewise absolute flower size and leaflet size, although undoubtedly somewhat variable with changing environmental conditions, are often more useful characters than are such extremely variable structural features as comparative length of staminal tube, shape and size of rachial glands or (in many species) number of leaflets per leaf. Legume characters are probably useful, but the lack of mature fruiting material of most species makes them impractical as a sole basis of segregation. Doubtless when fruiting material becomes as frequent as is flowering material today, variability in legume will become as noticeable as is variability in flower. Many species grade into others, and there is every reason to suppose that hybridization occurs in a number of species. Several rather well-defined complexes are discernible in the genus; and it is my belief that within these, species should be regarded in as broad a sense as possible and that considerable condensation is in order. Little correlation or condensation outside of Panama is attempted here because of the lack of many types in this hemisphere. Frequently in discussions at the end of the species descriptions, suggestions of similarity or relationship with extra-Panamanian species are given. Future collections may link new species or varieties described to previously known species, but at present it would scarcely seem advisable to lump all such divergent specimens into known categories without intermediate specimens bridging the gap.

Bentham's "Revision of the Suborder Mimoseae" (loc. cit. 1875) is a landmark in the classification of the genus, but at that date, of course, Bentham lacked the quantity of specimens needed to show intergradation of related "species." Pittier has worked with the genus to a considerable extent, introducing a number of new species and discussion of many others. His revision of the genus (Contr. U. S. Nat. Herb. 18:173-224. 1916) seems scarcely conservative enough, and many of his species are probably not valid segregates. This treatment was without keys, and is quite difficult to use for general determinative work. Pittier's "The Middle American Species of the Genus *Inga*" (Jour. Dept. Agr. Porto Rico 13:117-177. 1929) is a more usable appraisal, correcting many of the deficiencies of the earlier work. Unfortunately, Bentham's sections are more or less rigidly adhered to, and the keys are not easily workable. Pittier can be excused for having difficultly workable keys in a genus such as *Inga*, but it might have been wiser to seek a substitute for the legume characters needed to determine section and series. The treatment accorded *Inga* by Britton and Rose (N. Am. Fl. 23:2-16. 1928) is from the practical standpoint almost useless. Seldom will the key work, and many segregations appear untenable. Britton and Killip follow somewhat the same system in

their "Mimosaceae and Caesalpiniaceae of Colombia" (Ann. N. Y. Acad. Sci. 35:110-124. 1936). Macbride's "Flora of Peru—Leguminosae" (Field Mus. Publ. Bot. Ser. 13:6-47. 1943) and Standley and Steyermark's "Flora of Guatemala" (Fieldiana: Botany 24:34-46. 1946) seem to give a more conservative treatment for their areas. Ducke (Arch. Jard. Bot. Rio de Janeiro 4:19. 1925; 5:119. 1930; 6:13. 1933) has treated the species of *Inga* in the lower Amazon valley.

- a. Leaf rachis winged, at least in part.
 - b. Wing of rachis nearly obsolete; leaflets mostly less than 6 cm. long, subglabrous, blunt; legume flat, oblong, less than 4 times as long as broad; known only from the type (in fruit)..... 1. *I. DAVIDSONIAE*
 - bb. Rachis wing usually prominent; leaflets in most species much larger and frequently heavily pubescent; legume except in one or two species several times longer than broad.
 - c. Flowers unusually large or gross; calyx funnelform or campanulate, mostly 10-15 mm. broad apically; legume flat.
 - d. Calyx and leaflets subglabrous; leaflets 2 pairs..... 4. *I. PORTOBELLENSIS*
 - dd. Calyx and leaflets usually heavily pubescent; leaflets mostly 4 pairs..... 6. *I. GOLDMANII*
 - cc. Flowers thinner or more delicate; calyx rarely as much as 6 mm. wide, subtubular or else very small; legume varicos.
 - d. Calyx glabrous or sparingly pubescent.
 - e. Leaflets glabrous; inflorescence umbellate or capitate, or very long and laxly spicate.
 - f. Inflorescence umbellate or capitate; calyx at least 2 mm. long.
 - g. Calyx 2-3 mm. long; flowers long-pedicellate; terminal leaflets usually about 10 cm. long..... 2. *I. MYRIANTHA*
 - gg. Calyx at least 15 mm. long; flowers short-pedicellate or subsessile; terminal leaflets usually 20-30 cm. long..... 4. *I. PORTOBELLENSIS*
 - ff. Inflorescence elongate, lax; calyx about 1 mm. long..... 28. *I. MARGINATA*
 - ee. Leaflets pubescent at least on the veins; inflorescence a dense, short spike.
 - f. Floral bracts 10-20 mm. long, persistent; stipules subpersistent; calyx and lower leaf surface with darker "glandular" dots..... 11. *I. PANAMENSIS*
 - ff. Floral bracts minute or caducous; stipules caducous, at least in age; plant not noticeably "glandular" dotted.
 - g. Spikes conspicuously pedunculate; leaflets mostly acuminate; corolla shorter than 8 mm., or longer than 35 mm.
 - h. Corolla never longer than 8 mm.; branchlets cinereous-pubescent; leaflets lightly pubescent (except on veins); legume subglabrous, blackish..... 5. *I. DENSIFLORA*
 - hh. Corolla longer than 35 mm.; branchlets dark-tomentose; leaflets rather heavily pubescent; legume densely ferruginous-strigose..... 8. *I. MUCUNA*
 - gg. Spikes subsessile, the condensed floriferous portion obscuring the peduncular portion; leaflets acute to rounded, rarely acuminate; corolla 13-16 mm. long..... 9. *I. HAYESII*
 - dd. Calyx noticeably pubescent, usually tomentose.
 - e. Inflorescence umbellate, the flowers slenderly long-pedicellate.... 2. *I. MYRIANTHA*
 - ee. Inflorescence spicate, the flowers sessile or rarely short-pedicellate.
 - f. Leaflets glabrous or very sparingly appressed-hirsute; young branchlets markedly angled, quadrangular; floral bracts ovate, subpersistent, about 1 cm. long; legume flat..... 10. *I. SPECTABILIS*
 - ff. Leaflets pubescent at least on the veins; young branchlets less markedly angled, subterete; floral bracts either nearly linear, or else small or caducous; legume tetragonal or subterete.

- g. Floral bracts 10-20 mm. long, subpersistent; legume broader, tetragonal, glabrous; leaflets minutely "glandular" below.
- h. Leaflets mostly 3 (or fewer) pairs; petiole scarcely winged; terminal rachial internode more prominently winged than penultimate.
- i. Corolla about 1.5 cm. long; staminal tube barely exerted; leaflet sparingly pubescent or subglabrous, even on the veins..... 11. *I. PANAMENSIS*
- ii. Corolla about 2 cm. long, the constricted tube obscured in bud by the calyx; staminal tube scarcely exerted; leaflet usually lightly hirsute or pilose over entire lower surface..... 11a. *I. PANAMENSIS*
var. *PITTIERI*
- iii. Corolla about 3 cm. long, the bud noticeably clavate; staminal tube well exerted; leaflet usually not prominently pubescent except on the veins..... 11b. *I. PANAMENSIS*
var. *CLAVATA*
- hh. Leaflets 4 pairs; petiole prominently winged; rachis about equally winged on all rachial internodes..... 12. *I. ALATOPETIOLA*
- gg. Floral bracts inconspicuous, small or caducous; legume slender, subterete or angled, tomentose; leaflets eglandular on lower surface.
- h. Tomentum of branchlets, petioles and young legume subhirsute, rubiginous or dark-ferruginous; buds and flowers dark, usually ferruginous or ferruginous-golden.
- i. Tertiary veins of leaflets conspicuously reticulate; calyx usually 3-6 mm. long; mature stamens 20-25 mm. long; rachis frequently scarcely winged except on terminal rachial internode, or this markedly larger than wing of lower rachial internodes..... 13. *I. OERSTEDIANA*
- ii. Tertiary veins of leaflets inconspicuous; calyx 8-10 mm. long; mature stamens almost 45 mm. long; rachis winged about equally on all or most rachial internodes..... 16. *I. PAUCIFLORA*
- hh. Tomentum of branchlets, petioles, and young legume of shorter hairs, cinereous-ferruginous; buds and flowers light, cinereous or cinereous-golden.
- i. Leaflets ovate to elliptic or obovate, 5-8 cm. wide; flowers less robust, the calyx normally less than 8 mm. long.
- j. Flowers rather large, the calyx usually 7-8 mm. long and the corolla almost 2 cm. long; branchlets less prominently lenticellate..... 14. *I. EDULIS*
- jj. Flowers small, the calyx about 4 mm. long, the corolla about 8 mm. long; branchlets densely raised-lenticellate..... 14a. *I. EDULIS* var.
MINUTULA
- ii. Leaflets narrowly ovate-lanceolate to obovate-lanceolate, 2-5 cm. wide; flower stouter, the calyx 10-20 mm. long, or if only 8 mm. long the branchlets subhirsute.
- j. Leaflets mostly more than 4 pairs; calyx 10-20 mm. long; branchlets tomentose..... 15. *I. SPURIA*
- jj. Leaflets 3 or 4 pairs; calyx 8-10 mm. long; branchlets subhirsute..... 16. *I. PAUCIFLORA*
- aa. Leaf rachis unwinged or merely marginate.
- b. Leaflets 5 or more pairs.
- c. Pubescence setose or villous, of very long hairs; flowers long-pedicellate..... 17. *I. SAFFORDIANA*
- cc. Pubescence, if any, tomentose, of short hairs; flowers sessile.
- d. Leaflets moderately appressed-pubescent to tomentose below; leaflets mostly broadest at or below the middle; flowers larger, the calyx 5-12 mm. long.

- e. Leaflets moderately pubescent; branchlets ferruginous-tomentose; legume somewhat flattened?..... 18. *I. MULTIJUGA*
 - ee. Leaflets heavily pubescent; branchlets dark-rubiginous-tomentose; legume terete?; known only from the incomplete type.... 19. *I. COCLEENSIS*
 - dd. Leaflets subglabrous or scatteringly puberulent; leaflets broadest above or below the middle; flowers small, the calyx 3-4 mm. long.
 - e. At least the terminal leaflets broadest above the middle; leaflets usually 6 pairs; flower rather large (calyx 3-4 mm., corolla 7-8 mm. long), densely puberulent..... 20. *I. RUIZIANA*
 - ee. Leaflets broadest at or below the middle; leaflets 4-5 pairs; flower smaller (calyx about 2 mm., corolla 4-6 mm. long), lightly puberulent..... 21. *I. MICROSTACHYA*
 - bb. Leaflets 3 (rarely 4) or fewer pairs.
 - c. Flowers large and stout, the corolla 15-25 mm. long, the calyx either about 9 mm. long or else woolly and nearly 5 mm. wide.
 - d. Leaflets 4 pairs; calyx cupular, lanose-tomentose; floral bracts small, caducous..... 7. *I. STANDLEYANA*
 - dd. Leaflets 1-3 pairs; calyx somewhat tubular, not woolly; floral bracts 10 mm. long or longer, subsistent.
 - e. Leaflets glabrous or very sparingly appressed-hirsute; young branchlets markedly angled; floral bracts ovate; legume flat.... 10. *I. SPECTABILIS*
 - ee. Leaflets pubescent at least on the veins; branchlets subterete; floral bracts linear; legume tetragonal..... 11a. *I. PANAMENSIS*
var. *CLAVATA*
 - cc. Flowers small, the corolla seldom more than 10 mm. long, the calyx 1-7 mm. long and up to 2 mm. wide.
 - d. Floriferous portion of spike short, condensed, usually less than 1 cm. long.
 - e. Inflorescence capitate or umbellate, bearing flowers from the terminal few mm.
 - f. Flowers pubescent, somewhat pedicellate; leaflets rarely as much as 18 cm. long, the terminal ones usually 12-16 cm. long.
 - g. Pubescence of twigs and inflorescence setose or villous, of very long hairs; pedicels almost 2 cm. long; legume dark villous..... 17. *I. SAFFORDIANA*
 - gg. Pubescence of young twigs and inflorescence tomentose, of short hairs; pedicels scarcely 0.5 cm. long; legume tomentulose.
 - h. Pedicels as long as the calyx; calyx somewhat expanding basally and subcampanulate..... 22. *I. ROUSSOVIANA*
 - hh. Pedicels conspicuously shorter than the calyx; calyx funnellform, narrow basally..... 23. *I. WILLIAMSHI*
 - ff. Flowers glabrous or subglabrous, prominently pedicellate or sessile; leaflets either very large, 13-40 cm. long, or very small, 2-10 cm. long.
 - g. Flowers prominently pedicellate; leaflets small, 2-10 cm. long, usually 1-2 pairs..... 3. *I. HETEROPHYLLA*
 - gg. Flowers sessile or subsessile; leaflets large, 13-40 cm. long, usually 3 pairs..... 24. *I. GIGANTIFOLIOLA*
 - ee. Inflorescence short-spicate, bearing flowers for about 1 cm. of its length.
 - f. Leaflets 2-3 pairs; twigs and leaflets strigose-puberulent; calyx 3-5 mm. long..... 25. *I. PUNCTATA*
 - ff. Leaflets 4-5 pairs; twigs and leaflets subglabrous; calyx about 2 mm. long..... 21. *I. MICROSTACHYA*
- dd. Floriferous portion of spike elongate, lax, usually about 8 cm. long.
 - e. Rachis unwinged, scarcely marginate; leaflets usually broadly elliptic, bluntly short-acuminate.
 - f. Leaflets 4-12 cm. long and 1.5-5.5 cm. wide, mostly 2 pairs; stipules and stipule-like bracts not apparent, or at most 6 mm. long..... 26. *I. LAURINA*

- ff. Leaflets larger, the terminal pair about 15 cm. long and 6-7 cm. wide, mostly 3 pairs; stipules and stipule-like bracts of new growth and buds conspicuous, mostly 8-12 mm. long..... 27. *I. CALDASIANA*
- cc. Rachis briefly winged or decidedly marginate terminally; leaflets usually narrowly elliptic or elliptic-lanceolate, sharply long-acuminate..... 28. *I. MARGINATA*

1. *INGA DAVIDSONIAE* Standl. in Field Mus. Publ. Bot. 22:79. 1940.

Small tree, the branchlets ferruginous-tomentose becoming glabrate and noticeably lenticellate with age. Leaves comparatively small, about 10-foliolate; petiole 5-15 mm. long, terete, lightly tomentose; rachis 3-7 cm. long, very narrowly alate (wing most conspicuous on uppermost foliolar internode), pubescent although lightly so on the wings, bearing small, sessile, cupuliform glands between insertion of the petiolules; leaflets unusually small, oblong or elliptic to ovate-lanceolate, about 7 cm. long and 3.5 cm. wide in largest (terminal) leaflets, scarcely 2 cm. long and 1 cm. wide in smallest (basal) leaflets, subtruncate to bluntly acute apically, rounded or obtuse and somewhat inequilateral basally, coriaceous, subglabrous except on the midvein and glossy above, noticeably pubescent on the veins and dull below; stipules caducous. Inflorescence an axillary, pedunculate spike nearly 5 cm. long, the floriferous portion little more than 1 cm. long. Flowers not known. Legume oblong, about 12 cm. long and 5 cm. wide, flat, more or less truncate apically and basally, transversely striate, tomentose becoming subglabrate in age, the valvular margins sulcate.

Known only from the type.

CHIRIQUÍ: Volcán de Chiriquí, *Davidson 943*.

The leaflets of this species have a "*Pitbecolobium* appearance," but the legume scarcely resembles any species of that genus with once-pinnate leaves. Lack of flowers prevents accurate comparison with other species of *Inga*, but the small, coriaceous, glossy, rather variably shaped leaflets are distinctive. The legume much resembles that of *I. monticola* Pittier.

2. *INGA MYRIANTHA* Poepp. & Endl. Nov. Gen. & Sp. 3:77, pl. 289. 1845.

Inga gracilipes Standl. in Jour. Wash. Acad. 15:101. 1925.

Inga Lauranceana Britt. & Killip, in Phytologia 1:23. 1933.

Small tree, the branchlets subglabrous and very densely white-lenticellate. Leaves of moderate size, 4- (rarely 6- or 2-) foliolate; petiole 1-3 cm. long, terete basally, prominently marginate or alate apically, glabrous or somewhat puberulent above; rachis 2-5 cm. long, essentially glabrous, alate between leaflet pairs (wing broadest at apex of rachial internode, narrowing baseward), bearing prominent patelliform or subcupulate glands above at the rachial nodes; leaflets usually 2 pairs, mostly elliptic, the terminal pair about 10 cm. long and 4 cm. wide, the basal pair half or less this size, obtuse or broadly cuneate basally, short-acuminate apically, completely glabrous, lustrous, the prominent lateral veins about 5 pairs; stipules linear, about 5 mm. long, caducous. Inflorescence of pedunculate umbels, axillary

or subterminal from young defoliate nodes; peduncles 2-5 cm. long, almost glabrous; pedicels slender, almost 1 cm. long, lightly puberulent; floral bracts linear-clavate, 2-3 mm. long, subsistent. Flowers delicate, greenish-white; calyx cupuliform-tubular, about 3 mm. long, subglabrous or lightly puberulent, the teeth triangular and about 0.5 mm. long; corolla tubular-funnelform, about 8 mm. long, slightly broadened apically, glabrous except puberulent on the lobes, substriate; stamens 2-3 cm. long, the staminal tube exserted. Young legume flat, subglabrous, margined.

Panama.

CANAL ZONE: Barro Colorado Island, *Bangham* 488, 522; *Salvoza* 929; *Woodworth* & *Vestal* 587; *France Field*, *Standley* 30353.

An interesting species apparently without close affinities in Panama, distinguished by the graceful, prominently pedicellate flowers. The species has not previously been reported from Central America as *I. myriantha*. South American material of the species varies in flower size, and some Peruvian specimens have flowers almost $\frac{1}{3}$ again as large as the specimens here cited. Other Amazonian material seems identical with the Panamanian specimens. In deciding that *I. gracilipes* is not distinct from *I. myriantha*, it has been necessary for comparison to rely on the original description and illustration, plus limited herbarium material of *I. myriantha*, the type specimen not being available.

3. *INGA HETEROPHYLLA* Willd. Sp. Pl. 1020. 1806.

Mimosa Parae Poir. in Lam. Encycl. Meth. Suppl. 1:44. 1810.

Inga umbellata G. Don, Gen. Hist. Dichl. Pl. 2:391. 1832.

Inga protracta Steud. in Flora 26:758. 1843, fide Benth.

Shrub or small tree, the branchlets puberulent when very young, soon becoming glabrous, lenticellate. Leaves moderate, the leaflets 1-2 (sometimes more?) pairs; petiole short, usually less than 1 cm. long, glabrous in age, subsulcate above, eglandular; rachis frequently exceeding the petiole, unwinged, glabrous, bearing cylindrical glands at insertion of the pairs of petiolules, at least in the larger leaves; leaflets elliptic, 2-10 cm. long and 1-4 cm. wide, in quadrifoliate leaves the basal pair of leaflets the smaller, acuminate and markedly attenuate apically, cuneate basally, glabrous, the venation reticulate and prominent below; stipules linear, about 2 mm. long, caducous. Inflorescence of axillary pedunculate umbels, slender and delicate; peduncles up to 2 cm. long; pedicels 4-12 mm. long, glabrous. Flowers moderate; calyx cupulate, scarcely 1 mm. long, glabrous; corolla tubular-funnelform, 5-6 mm. long, glabrous, the tube about twice as long as the lobes; staminal tube exserted. Legume linear, up to 13 or 14 cm. long and about 17 mm. wide, flat, glabrous, nearly straight, short-stipitate.

Panama to middle South America.

COCLÉ: Bismarck, *Williams* 600.

The cited specimen, examined for the North American Flora, was found in-

correctly determined as *I. laurina*, and constitutes a new record for *I. heterophylla* north of South America. The specimen is in fruit, but is apparently referable to this species; certainly it is as much so as is South American material of various herbaria commonly passing as *I. heterophylla*. There is some doubt that *I. mapiricensis* Pittier, *I. Jenmani* Sandw., and perhaps other species, can be maintained distinct from *I. heterophylla*. Other species related to *I. heterophylla* are: *I. cynometrifolia* Harms, *I. sertulifera* DC., *I. tarapotensis* Spruce, *I. myriantha* P. & E., and *I. coriacea* (Pers.) Desv.

4. *INGA PORTOBELLENSIS* Beurl. in Svensk. Vet. Akad. Handl. 1854:122. 1856.

Inga macrophylla Billb. ex Beurl. loc. cit. 123. 1856, fide Ind. Kew.

Tree more or less glabrous throughout, the young branchlets with elongate lenticels. Leaves large, bijugate; petiole usually 2–3 cm. long, winged (the wing narrowing baseward and the petiole subterete basally); rachis usually 6–8 cm. long, spatulate-winged like the petiole, bearing at insertion of the pairs of leaflets an elevated, cupuliform gland, bearing apically in young leaves a (deciduous) mucronate appendage as much as 15 mm. long; leaflets 2 pairs, obovate-oblong, 20–30 cm. long, 10–13 cm. wide in apical pair (basal pair only half as long), obtuse basally, abruptly acuminate apically, darker above than below, glabrous except occasionally puberulent on the costa; stipules ovate-subfalcate, about 16 mm. long, subpersistent. Inflorescence of solitary, axillary, pedunculate heads (or very condensed spikes); peduncle 3–8? cm. long, glabrous; bracts of head ovate or lanceolate, 7–8 mm. long, late-caducous. Flowers short to moderately pedicellate, large and showy; calyx tubular-funnelform, about 25 mm. long, striate, glabrous except pubescent on tips of the lobes; corolla tubular, almost 4 cm. long, glabrous except canescent-pubescent on the lobes; stamens as much as 7–8 cm. long, the staminal tube well-exserted; ovary glabrous. Legume flat, about 16 cm. long and 2.5 cm. wide, arcuate, ligneous, thickened on the margins.

Panama and Costa Rica.

We have examined no Panamanian material (unless *Allen 17282* be this species: see "Specimens of Uncertain Status"). The (European) type, however, is from Porto Bello, province of Colón, Panama. Costa Rican material does not match the original description in some respects, but we accept Pittier's and Britton and Rose's citations as correct for this name. The species seems to be unusual and striking.

5. *INGA DENSIFLORA* Benth. in Trans. Linn. Soc. 30:617. 1875.

Inga monticola Pittier, in Contr. U. S. Nat. Herb. 18:190, pl. 96. 1916.

Inga java Pittier, in Trab. Mus. Com. Venez. 5:261. 1929.

Large, spreading tree about 16 m. tall, the branchlets lightly or moderately cinereous-tomentose. Leaves moderately large, 8-foliolate; petiole scarcely 1 cm. long, terete, tomentose, swollen basally; rachis up to 10 cm. long, narrowly alate

(sometimes obscurely so on lowermost rachial internode), tomentose along the axis, bearing above at the rachial nodes a sessile, patelliform gland; leaflets normally 4 pairs, elliptic to elliptic-lanceolate, 10–20 cm. long and 5–7 cm. wide in the terminal pair, usually short-acuminate apically, obtuse to blunt and somewhat inequilateral basally, heavily pubescent on costa and chief veins, loosely appressed-strigose or subglabrous and "glandular" elsewhere; stipules linear, about 5 mm. long, caducous. Inflorescence of 1–2 pedunculate spikes borne from subterminal axils; peduncle 3–6 cm. long, pubescent; floriferous portion of spike usually 1–3 cm. long, the flowers very congested; bracts small, caducous. Flowers small, white, sessile; calyx tubular-funnelform, about 4 mm. long, subglabrous or sparsely strigose, striate; corolla tubular, 7–8 mm. long, hirsute-strigose; stamens 15 or more mm. long, the staminal tube scarcely exerted. Legume broad, flat, up to 16 cm. long and 5 cm. wide, slightly margined, transversely striate, subglabrous in age, blackish, several-seeded.

Northern South America and Panama.

COCLÉ: Bismarck, *Williams* 316. SAN BLAS: Permé, *Cooper* 651.

The San Blas specimen differs from the Coclé one (type of *I. monticola*) in degree of pubescence, size of leaflet, and in other minor ways. The latter probably reflects intermixture with other species towards the northern extremity of its range. The San Blas specimen is nearly identical with the type of *I. java* (from tree planted for coffee shade in Venezuela).

6. INGA GOLDMANII Pittier, in Contr. U. S. Nat. Herb. 18:198. 1916.

Moderate-sized tree, the branchlets ferruginous-hirsute. Leaves large, mostly 8-foliolate; petiole usually about 1 cm. long, alate, hirsute except lightly pubescent on the wings; rachis up to 20 cm. long, similar to the petiole, the wing about 5 mm. wide from midrachis to margin, bearing short-stipitate, cupuliform glands between insertion of the petiolules; leaflets mostly 4 pairs, ovate to elliptic, up to 25 cm. long and 15 cm. wide, the terminal pair about twice as long as the basal pair, acute and short-acuminate apically, rounded and inequilateral basally, subglabrous above except on the midvein (midvein heavily pubescent and usually bearing 1–2 small glands basally), laxly pubescent below especially on the veins; stipules broadly ovate, caducous in age. Inflorescence a stout terminal or axillary spike, the peduncular portion about 8 cm. long and hirsute, the floriferous portion up to 6 or 7 cm. long; bracts broadly ovate, scarcely 4 mm. long, hirsute, deciduous in age. Flowers very broad and stout; calyx subcampanulate, about 13 mm. long and almost as wide (apically), densely hirsute-tomentose; corolla tubular-campanulate, 2 cm. long or longer, densely villous without; stamens about 6 cm. long, the staminal tube included. Legume flat, about 18 cm. long and 4 cm. wide?, somewhat arcuate, stipitate, densely ferruginous-hirsute, the margins not unduly thickened.

Panama and Costa Rica.

CANAL ZONE: Frijoles, *Allen 922*; Gatún, *Goldman 1866*; Lion Hill Station, *S. Hayes 598*; Monney? Hill, *Lehmann 1001*; near Salamanca, *Steyermark & Allen 16754*.

This species has been segregated from Benthham's original concept of *I. Lindeniana*, and without reference to the (European) type of *I. Lindeniana* it is impossible here to pass judgment on the validity of the segregation. Perhaps the most definitive difference given by Pittier between *I. Goldmanii* and *I. Lindeniana* is the considerably lesser pubescence of the former. Certain herbarium specimens (in fruit) labeled *I. mucuna* are evidently referable here.

7. *INGA STANDLEYANA* Pittier, in Contr. U. S. Nat. Herb. 18:204. 1916.

Low tree, the branchlets densely dark ferruginous-tomentose. Leaves large, 8-foliolate; petiole 2-4 cm. long, terete, tomentose like the branchlets, swollen basally; rachis about 11 cm. long, unwinged, similar to the petiole, bearing sessile, urceolate glands above between insertions of the petiolules; leaflets 4 pairs, broadly ovate or obovate, about 12 cm. long and 7-8 cm. wide in terminal pair (lowermost pair about $\frac{1}{2}$ as long), rounded or obtuse or briefly acute, and very briefly mucronate apically, obtuse or rounded and somewhat inequilateral basally, pilose below, subglabrous above except tomentose on the costa and chief veins, reticulate, darker above than below; stipules caducous. Inflorescence of 1-2 pedunculate spikes axillary and subterminal from the upper branchlets; peduncular portion 2-4 cm. long, tomentose like the branchlets; floriferous portion equally long, the flowers somewhat distant; floral bracts ovate, 1 mm. long, caducous. Flowers large, sessile; calyx cupular, about 5 mm. long and equally as wide, lanose-tomentose, the teeth scarcely discernible because of the pubescence; corolla funnelform, 17-20 mm. long, gross, lanose-tomentose; stamens about 5 cm. long, the staminal tube barely exerted; ovary white-pubescent along sutural line; style 5 mm. long; stigma capitate. Legume reported flat and densely rufous-pubescent.

Panama.

DARIÉN: La Palma, *Pittier 5496*.

This species is readily distinguished from others in Panama by the gross, woolly flower. It is said to be quite similar to *I. dysantha* of South America, a species of which no specimens have been available for comparison.

8. *INGA MUCUNA* Walp. & Duchass. in Walp. Ann. 2:459. 1851-52.

Moderate-sized tree, the branchlets dark hirsute-tomentose. Leaves moderate, the leaflets 6- or 8-foliolate; petiole about 2 cm. long, heavily tomentose, terete and unwinged; rachis up to 15 cm. long, with prominent interfoliolar wings about 5 mm. wide from rib to margin, the rib tomentose, the wings more lightly pubescent, with small, sessile, subcupuliform glands between insertion of the leaflets; leaflets apparently 3 or 4 pairs, mostly ovate, up to 15 cm. long and 7 cm. wide terminally, progressively smaller baseward, apically acute and short-acuminate, basally inequilaterally rounded or obtuse, rather heavily pubescent with curved hairs below and above; stipules triangular-ovate, about 6 mm. long, soon deciduous. In-

florescence of 1 to few? pedunculate spikes axillary from the upper leaves, the peduncular portion hirsute-tomentose, about 4 cm. long, the floriferous portion less heavily pubescent, 3-5 cm. long; bracts ovate-elliptic, about 6 mm. long, caducous. Flowers white, very elongate; calyx tubular, 13-17 mm. long, longitudinally striate or sulcate, subglabrous except at the apex of the teeth, the teeth 1-2 mm. long; corolla 4-5 cm. long, pilose without (sparingly so in age), the hairs 3 mm. long or longer, the lobes somewhat flaring, about 5 mm. long; stamens up to 10 cm. long, the staminal tube exerted about 2 cm. beyond the corolla; ovary tetragonal and indented on opposite faces. Legume up to 30 cm. long and 5 cm. wide, usually spirally twisted, densely ferruginous-strigose, the margins deeply sulcate along the line of dehiscence.

Panama; northern South America?

CANAL ZONE: Barro Colorado Island, Woodworth & Vestal 665. DARIÉN: Boca de Cupe, Allen 882; Sambú River, Pittier 5525. PROVINCE UNKNOWN: "Panama," Duchassaing 81.

The cited specimens certainly seem to belong to section PSEUDINGA, series LONGIFLORAE as considered by Pittier in his revision of *Inga*. Of this series only one species, *I. mucuna*, is reported north of South America: thus the species' affinities are chiefly South American (Brazil especially). Without fruit as a criterion, a specimen of this species might key to (Pittier's) *I. oophylla*, *I. Rodrigueziana*, *I. Rensoni*, *I. Preussii* or *I. Holtonii*, but it differs from all of these in having the extremely elongate corolla. Brazilian specimens in the herbarium labeled *I. calantha* Ducke (Krukoff 6204, fruit only) appear very similar to the Panamanian specimens, and possibly are identical.

9. *INGA HAYESII* Benth. in Trans. Linn. Soc. 30:617. 1875.

Feuilléea Hayesii Ktze. Rev. Gen. Pl. 1:188. 1891.

Small tree, the branchlets rather heavily pubescent when young becoming glabrous. Leaves moderate, 4- to 8-foliolate; petiole 1-2 cm. long, pubescent especially medianly, narrowly winged except at the extreme base; rachis 2-10 cm. long, similar to the petiole except the rachial internodes prominently alate (wing up to 5 mm. wide measured from midrachis), bearing sessile, patelliform or cupuliform glands between insertion of the petiolules; leaflets 2-4 pairs, ovate, oblong or elliptic, the larger (terminal) ones as much as 15 cm. long and 7 cm. wide, the smaller (basal) ones about 5 cm. long and 2.5 cm. wide, acute, obtuse or even rounded apically, obtuse or rounded basally and not markedly inequilateral, with scattered curved-appressed hairs above and below, the veins prominent below; stipules broadly ovate, 2-3 mm. broad, soon caducous. Inflorescence very condensed, of 1 to few? axillary spikes from the tips of branches, the peduncular portion usually less than 1 cm. long and obscured by the compact floriferous portion 1-3 cm. long; bracts lanceolate, inconspicuous, at most a few mm. long. Flowers whitish, densely compacted; calyx tubular, 6-9 mm. long, subglabrous except for small tufts of hair at the tip of calyx lobes and sometimes the base of

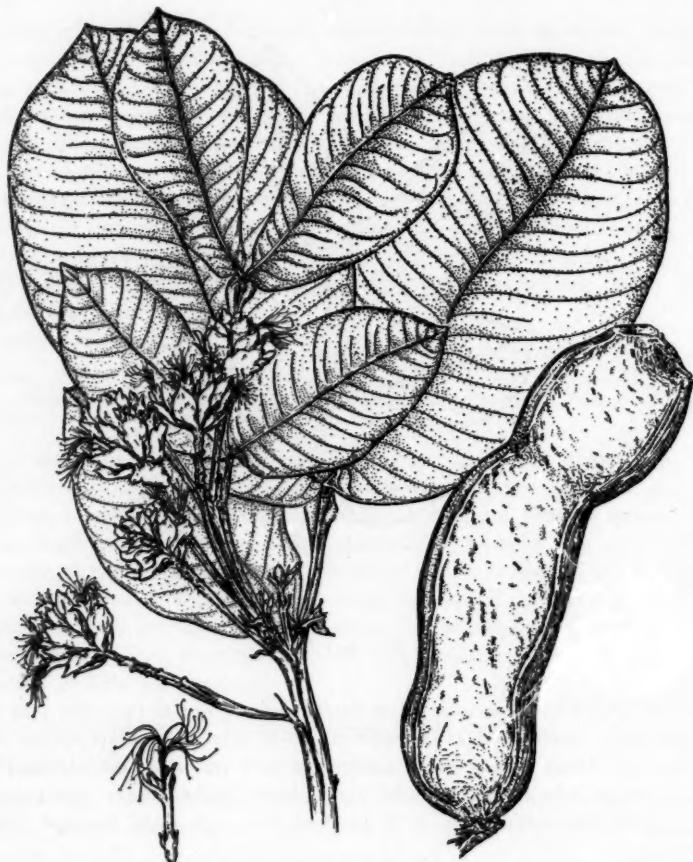
Fig. 75. *Inga Hayesii*

the calyx, longitudinally striate, rather deeply cleft on one or two sides (the teeth thus unequal); corolla tubular-funnelform, 13–16 mm. long, silvery-pilose without, the lobes about 3 mm. long; stamens up to 4 cm. long, the staminal tube included; ovary subglabrous, 4-angled due to lateral indentations; stigma capitate. Legume linear-oblong, up to 17 cm. long and 2 cm. wide, flattened, yellow-tomentose.

Panama.

CANAL ZONE: Ancon Hill, Seibert 115; Fort Kobe road, Allen 1890; Miraflores; P. White 79. PANAMÁ: Matías Hernández, Pittier 6714; Pacora, Woodson, Allen & Seibert 759; Pearl Islands, Allen 2593.

The cited specimens comprise an entity in many ways imperfectly matching various descriptions of *I. Hayesii*. Nevertheless, knowing the extreme variation and intergradation common in *Inga*, it would be presumptuous to regard them as a different species. The short-pedunculate spike is perhaps the species' outstanding characteristic, and this, along with the subglabrous, striate calyx and relatively light leaf pubescence, tends to distinguish *I. Hayesii* from most (otherwise) similar species. Some specimens of *I. spuria* much resemble the cited specimens except for larger flower size and generally greater leaflet number.

Fig. 76. *Inga spectabilis*

10. *INGA SPECTABILIS* (Vahl) Willd. Sp. Pl. 4:1017. 1806.

Mimosa spectabilis Vahl, Skr. Natur. Selsk. Kjöb. 2:219, pl. 10. 1792.

Inga fulgens Kunth, Mimos. Pl. Legum. 36, pl. 11. 1819.

Inga lucida HBK. Nov. Gen. & Sp. 6:287. 1824.

Feuilléa spectabilis Ktze. Rev. Gen. Pl. 1:184. 1891.

Moderate-sized tree, the branchlets lightly pubescent to glabrous and markedly angled, lenticellate. Leaves large, mostly 4-foliolate; petioles scarcely 1 cm. long, angled or short-winged, sometimes puberulent; rachis up to 7 or more cm. long, somewhat puberulent, alate towards the upper part of each rachial internode (the

wing broadest just below insertion of the leaflets), the wing from subobsolete to 7 or 8 mm. wide measured from midrachis, bearing a large, cupuliform or patelliform gland between insertion of the petiolules, usually puberulent at least medianly above; leaflets 1-3 (usually 2) pairs, elliptic or nearly so, up to 25 cm. long and 15 cm. wide in terminal pair, the basal pair smaller (often lacking in herbarium material), rounded to acute apically, more or less obtuse and inequilateral basally, coriaceous, glabrous above in maturity, subglabrous below, the veins impressed above and prominently elevated below, the alternate lateral veins much shorter than the others; stipules linear to linear-lanceolate or linear-oblongate, about 1 cm. long, subpersistent. Inflorescence mostly a terminal panicle of pedunculate spikes (the spikes sometimes solitary from an axil), the peduncular portion generally 4-5 cm. long and lightly puberulent, the floriferous portion about 5 cm. long and tomentulose, the flowers more or less congested; bracts nearly elliptic, up to 2 cm. long and almost 1 cm. wide, more or less persistent, tomentulose. Flowers white; calyx tubular-campanulate, about 9 mm. long, pubescent, somewhat cleft to one side, the teeth about 3 mm. long; corolla tubular, about 2 cm. long, tomentose, the lobes somewhat flaring; stamens about 4 cm. long, the staminal tube about equalling the corolla. Legume flat, reported up to 60 cm. long and 7 cm. wide, the margins thick but not elevated, glabrous.

Costa Rica, Panama, northern South America.

BOCAS DEL TORO: Chiriquí Lagoon, *H. von Wedel* 2392. CANAL ZONE: Culebra, *Pittier* 2423; Las Cascadas, *Pittier* 3746. CHIRIQUÍ: trail from San Felix, *Allen* 1944. COCLÉ: Bismarck, *Williams* 383, 584. PANAMÁ: Taboga Island, *Maxon* 6922. WITHOUT LOCALITY: *Cooper & Slater* 203.

11. *INGA PANAMENSIS* Seem. Bot. Voy. Herald, 117. 1853.

Small tree, the branchlets slender, essentially terete, pubescent when young becoming glabrous in age, conspicuously lenticellate. Leaves large, 2- to 6-foliate; petiole 4-5 cm. long, terete or somewhat angled above apically, lightly pubescent or nearly glabrous, swollen basally; rachis as long as (or longer than?) the petiole, similar to the petiole except narrowly winged, bearing at insertion of the petiolules small, concave, sessile glands; leaflets mostly 2 pairs in isotype examined, broadly oblong to elliptic-obovate, terminal ones up to 15 or more cm. long and almost 10 cm. wide (basal leaflets $\frac{2}{3}$ or less this size), obtuse or rounded and somewhat inequilateral basally, rounded and briefly mucronate apically, glabrous above, scantily pubescent (especially on veins) and "glandular" below, the veins prominently elevated below, the lateral ones about 12 pairs; stipules ovate, about 6 or 7 mm. long, persistent. Inflorescence of axillary, pedunculate spikes 3-7 cm. long; peduncular portion 2-4.5 cm. long, lightly pubescent, striate; floral bracts linear, about 1 cm. long, persistent, lightly pubescent. Flowers moderate, whitish?; calyx cupular-tubular, 5-8 mm. long, lightly pubescent, striate, the teeth prominent and irregular or unequal; corolla tubular-funnelform, about 14 mm. long, golden appressed-pilose; stamens about 4 cm. long, the staminal tube some-

what exerted; ovary nearly glabrous; style exceeding the stamens; stigma capitate. Legume (reported) up to 15 or more cm. long and about 4 cm. broad, thick, glabrous, the margins very prominent.

Panama.

CANAL ZONE?: Cruces, Seemann 407.

Apparently this species has been collected but once. We have examined the Gray Herbarium isotype of the original collection which appears to be an aberrant form of a large Central American complex. The fact that no undoubted second collection has been made, although the type is from a comparatively well-known area, would support the belief in its aberrancy. Yet the name must take precedence over its more common varieties as here interpreted, in spite of being less "typical" of the complex as known in lower Central America than are its varieties. Two pairs of leaflets to the leaf is unusual for the group in Panama, although Mexican material frequently shows this characteristic. A number of specimens have leaves with both 2 and 3 or 3 and 4 pairs of leaflets.

Many taxonomists will doubtless take exception to my condensation and reduction to varietal status (under *I. panamensis*) of numerous "species" of this complex. It is conceded that the types of such varieties scarcely resemble the species, and that certain extremes among them more resemble other accepted species than *I. panamensis*. Yet when all available material is examined, no clear-cut specific demarcation can be found within the complex. After days of fruitless effort attempting such, it was deemed wiser to regard as of varietal status some fairly constant but difficultly distinguishable entities. These embraced most of the species of Pittier's series TETRAGONAE.

One of the entities (*I. panamensis* var. *clavata*) appears fairly clear-cut. It is found throughout Panama (especially in Bocas del Toro) and in Costa Rica. It differs from the species in having a much longer flower, but vegetative differences (except leaflet number) are scarcely apparent. Another less clear entity (*I. panamensis* var. *Pittieri*) is found in central and western (Chiriquí) Panama and adjacent Costa Rica. It has a flower only a little longer than in the species but the leaflet shape is different and its lower surface more heavily pubescent. Like *I. panamensis* var. *clavata*, it normally has 3 pairs of leaflets per leaf.

A third variety (*I. panamensis* var. *Rodrigueziana*), including a very variable group of "species" and specimens from Costa Rica and Nicaragua to Mexico all grading into one another, is proposed as a convenient catch-all within the complex for northern Central America. The type specimen (for the species from which the varietal name is taken) is quite unlike *I. panamensis*—4 pairs of leaflets, moderately long flowers, heavy pubescence—yet it seems to grade quite imperceptibly into forms scarcely distinguishable from *I. panamensis* var. *Pittieri*. In flower size var. *Rodrigueziana* is intermediate between var. *clavata* and var. *Pittieri*. Some of the synonyms listed for it (viz. *I. Purpusii*) may with further collections merit varietal standing of their own.

All in all, the species and its varieties comprise a difficult complex, on which it is perhaps profitless to devote inordinate time in the attempt to make detailed taxonomic distinctions.

11a. *INGA PANAMENSIS* Seem. var. **Pittieri** (Micheli) Schery, comb. nov.

Inga Pittieri Micheli, in Bull. Herb. Boiss. 2:446, pl. 13. 1894.

Inga Jimeneziana Pittier, in Contr. U. S. Nat. Herb. 18:208. 1916.

This variety differs from the species in having a slightly longer flower (corolla 20 mm. long vs. 14 mm. in species) and in having normally 6 large, tapered, more pubescent leaflets. The legume is linear-oblong, up to 25 cm. long and 2.0–2.5 cm. wide and thick, tetragonal, the valves deeply sulcate medianly (dry material), the juncture of valves slightly protruding from the otherwise flat face presented by the valve margins, essentially glabrous, scarcely stipitate basally.



Fig. 77. *Inga panamensis* var. *Pittieri*

Panama and Costa Rica.

CANAL ZONE: Gatún, Wetmore & Abbe 34; Quebrada La Palma, Dodge & Allen 7340.
CHIRIQUÍ: San Felix, Pittier 5452. COCLÉ: Bismarck 489.



Fig. 78. *Inga panamensis* var. *clavata*

11b. *INGA PANAMENSIS* Seem. var. *clavata*, Schery, var. nov.

Arbor ab specie differt foliis subtus frequenter minus pubescentibus, floribus longioribus, ca. 3 cm. longis, staminibus 7-8 cm. longis, tubo plerumque exsertissimo.

On vegetative characters this variety is scarcely distinguishable from the species and the preceding variety. The flowers, however, are considerably longer than in the species, the corolla-tube extending well beyond the calyx and making the corolla in bud appear clavate. This same difference in degree is seen in the stamens and staminal tube, which are almost twice as long as in the species.

Costa Rica and Panama.

BOCAS DEL TORO: Changuinola Valley, *Dunlap* 523; *Cooper & Slater* 108; Water Valley, *H. von Wedel* 672 (Herb. Missouri Bot. Gard., TYPE), 849, 2749 (Herb. Missouri Bot. Gard., COTYPE). CANAL ZONE: Barro Colorado Island, *Kenoyer* 368; Darién Station, *Standley* 31610 (sterile); Empire, *Piper* 5112. COCLÉ: Bismarck, *Williams* 589 (sterile)? DARIÉN: Cituro, *Williams* 673.

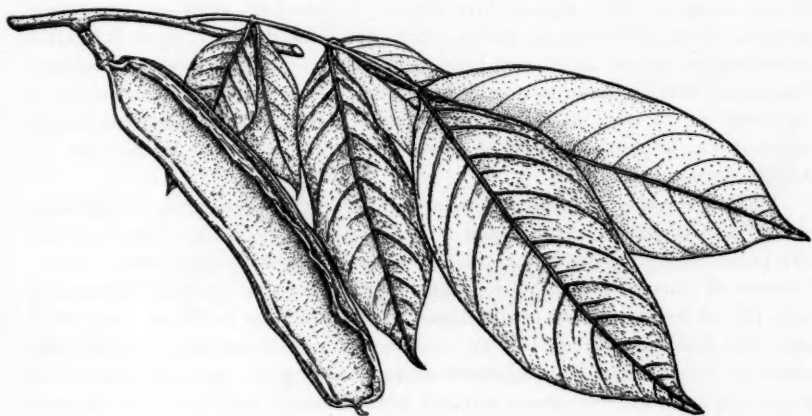


Fig. 79. *Inga panamensis* var. *Rodrigueziana*

11c. *INGA PANAMENSIS* Seem. var. *Rodrigueziana* (Pittier) Schery, comb. nov.

Inga Preussii Harms, in Fedde Rep. Sp. Nov. 13:420. 1914, ex char.

Inga Rodrigueziana Pittier, in Contr. U. S. Nat. Herb. 18:209. 1916.

Inga biolleyana Pittier, loc. cit. 207. 1916.

Inga Purpusii Pittier, loc. cit. 199. 1916.

This variety is distinguished from the species in having a more robust flower approximately 2.5 cm. long, and a more heavily pubescent leaflet (frequently subtomentose below).

In keeping with a very broad interpretation of *I. panamensis*, the synonyms listed above should constitute a variety of that species. This variety is not known to occur in Panama, but is found in southern Mexico, northern Central America, and perhaps aberrantly in Costa Rica (the type of *I. biolleyana* of Costa Rica appears to be but an extreme of this variety). Besides the type specimens of *I. Rodrigueziana* and *I. biolleyana*, specimens examined include:

NICARAGUA: *Baker* 35.

SALVADOR: *Calderón* 171; *Pittier* 1974; *Standley* 19109.

GUATEMALA: *Record* 47; *Tuerckheim* (J. D. Smith) 7855.

MEXICO: *Purpus* 6811.

Inga Preussii, in spite of priority, is not chosen as the name-bringing synonym for the variety for the reason that the type has not been available for examination.

12. *INGA alatopetiola* Schery, sp. nov.

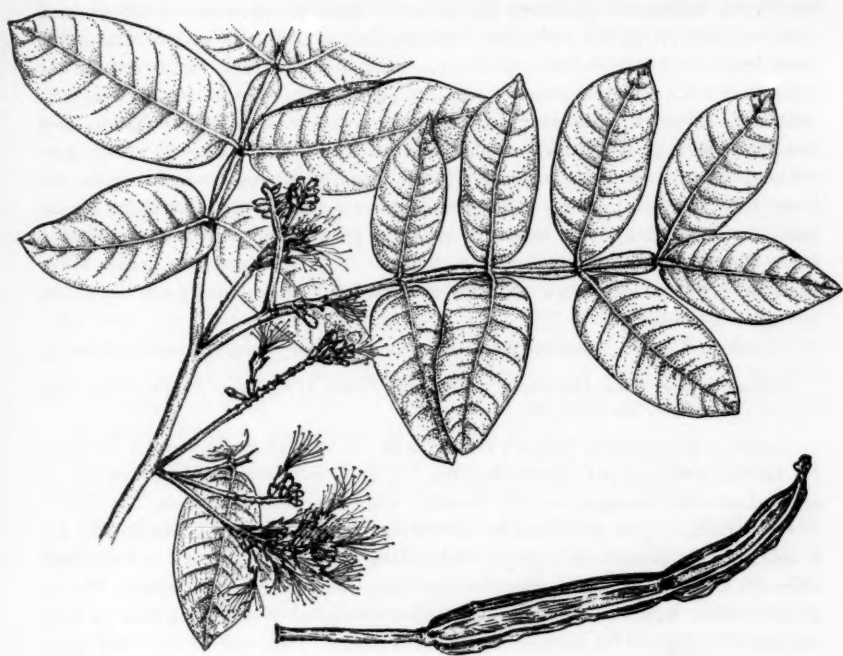
Arbor?, ramulis juvenalibus ferrugineo-pubescentibus; foliis magnis, petiolis ca. 2 cm. longis, prominenter alatis, costa pubescente, rhachibus ca. 15 cm. longis, glandulam substipitatam concavam ad insertionem parium foliolorum ornatis, foliolis 4-jugatis, ovato-ellipticis, ad 20 cm. longis, 8 cm. latis, basalibus parvioribus, breve-acuminatis, basi inaequaliter obtusis vel rotundatis, subglabris costa supra excepta, subtus leviter pilosis, nervis subtus prominenter elevatis supra indentatis; inflorescentia axillari, ca. 7 cm. longa, pedunculo ca. 3 cm. longo, ferrugineo-tomentoso; bracteis linearibus, ca. 1 cm. longis persistentibus tomentosis; calyce tubulato, ca. 15 mm. longo, striato, adpresso-piloso, dentibus brevibus; corolla tubulata, ca. 30 mm. longa, dense pilosa; staminibus ca. 5 cm. longis, tubo vix exserto; legumine ignoto.

Tree?, the young branchlets ferruginous-pubescent. Leaves large, once-pinnate, with 4 pairs of leaflets; petiole about 2 cm. long, alate, the wings subglabrous, the axis pubescent; rachis about 15 cm. long, similar to the petiole, prominently winged between all pairs of leaflets, bearing short-stipitate, concave glands at insertion of each pair of leaflets; leaflets ovate-elliptic, terminal pair up to 20 cm. long and 8 cm. wide, basal pair scarcely half this size, short-acuminate apically, inequilaterally obtuse or rounded basally, subglabrous above except on the costa, sparingly pilose below, the veins indented above, elevated below, coarsely reticulate. Inflorescence an axillary pedunculate spike, peduncular portion 3-4 cm. long, ferruginous-tomentose, floriferous portion similar, comparatively few-flowered, bracts essentially linear, densely pubescent, persistent. Flowers large, sessile; calyx tubular, about 15 mm. long, striate, appressed-pilose, the teeth short and somewhat unequal; corolla nearly tubular, about 30 mm. long, densely villous or pilose without, the lobes relatively short and slender; stamens approximately 5 cm. long, the staminal tube barely exserted; style elongate, exceeding the stamens, the stigma capitate. Legume not known.

Panama.

BOCAS DEL TORO: Almirante region, *Cooper & Slater* 65 (U. S. Nat. Herb., TYPE).

The type specimen is somewhat fragmentary, but is sufficient to indicate distinctiveness from known Panamanian species. Floral characters indicate affinities with *I. panamensis* (and Pittier's series TETRAGONAE), and future collections may link it to *I. panamensis* var. *Rodrigueziana*. The winged petiole is unusual in *Inga*, and serves, along with the persistent, linear bracts, the large "panamensis-type" flowers, and various leaf characters, to distinguish the species rather easily.

Fig. 80. *Inga Oerstediana*

13. *INGA OERSTEDIANA* Benth. in Seem. Bot. Voy. Herald, 117. 1852-57.

Feuilléea Oerstediana Ktze. Rev. Gen. Pl. 1:188. 1891.

Inga eriorhachis Harms, in Fedde Rep. Sp. Nov. 13:525. 1915.

Inga cobanensis Pittier, in Contr. U. S. Nat. Herb. 18:188. 1916.

Inga Tuerckheimii Pittier, loc. cit. 192. 1916, based on same type as *I. cobanensis*.

Inga chiriquensis Standl. in Field Mus. Publ. Bot. 22:78. 1940.

Small or moderate tree, the branchlets dark ferruginous-tomentose, becoming less densely so in age. Leaves large, normally 8-foliolate; petioles up to 5 cm. long, terete, densely dark ferruginous-tomentose; rachis up to 15 cm. long, tomentose like the petiole except very lightly so on the wings, conspicuously alate for the uppermost rachial internode, progressively less alate in penultimate and succeeding (lower) rachial internode(s), bearing between insertion of the petiolules large or small sessile glands (or these sometimes lacking), the glands laterally extended and markedly concave; leaflets 4 (sometimes 3 or 5) pairs, asymmetrically elliptic, oblong or ovate, 7-16 cm. long and 3-8 cm. wide, rounded or subtruncate basally, inequilaterally acute apically, lightly pubescent above except on the veins where

heavily so, moderately pubescent below except densely tomentose on the elevated veins, reticulate; stipules caducous. Inflorescence of 1 to few pedunculate spikes from foliate or young defoliate nodes, the spikes 3–7 cm. long, floriferous for the upper 1–3 cm., densely tomentose like the petiole; bracts ovate, small, promptly caducous. Flowers quite congested, white; calyx campanulate-cupuliform, 3–6 mm. long, ferruginous-hirsute or pilose, the teeth somewhat unequal; corolla sub-tubular, about 1 cm. long, somewhat flaring apically although constricted for the lower half its length; densely ferruginous-hirsute or pilose, the lobes about 2 mm. long; stamens 2.0–2.5 cm. long, the staminal tube included within the corolla; ovary linear, the style exceeding the stamens. Legume apparently linear, 12 or more cm. long and less than 1 cm. wide, subterete and longitudinally sulcate, sessile, ferruginous-tomentose.

Northern Central America, Costa Rica and Panama; northern South America.

CHIRIQUÍ: Bajo Mona, *Davidson* 536; Boquete, *Pittier* 3130; Cerro Punta, *Allen* 1573; Volcán de Chiriquí, *Davidson* 928.

Again it is impossible without reference to the type to establish with certainty the correct name to the specimens cited. If *I. Oerstediana* should prove not to apply, *I. eriorbachis* could be used. Standley and Steyermark (*Fieldiana*, Bot. 24:40. 1946) consider *I. coganensis* and *I. Tuerckheimii* as synonyms of *I. Micheliana*; yet it seems hardly possible to regard *I. Micheliana* a synonym of our *I. Oerstediana*, although *I. coganensis* and *I. Tuerckheimii* likely are this (*I. Oerstediana*). *Pittier*, among others, separated some of the possible synonyms given above into separate sections of the genus on the basis of fruit characters. Only one of the cited specimens is with fruit, and on vegetative appearance the others seem to be the same species. It would seem that fruit characters have been overstressed in separating the genus into often unworkable sections, especially in that fruiting specimens are so rarely available. Almost certainly when extensive fruiting specimens are gathered, variation and degrees of intermediacy will be found, perhaps indicating fruit characters to be little more reliable and certainly less practical taxonomically than floral and vegetative characters.

14. *INGA EDULIS* Mart. in *Flora* 20:Beibl. 113. 1837.

Mimosa Ynga Vell. *Fl. Flum. Ic.* 11:t. 3. 1827, fide Benth.

Inga vera HBK. *Nov. Gen. & Sp.* 6:289. 1824, non Willd., fide Benth.

Feuilléa edulis (Mart.) Ktze. *Rev. Gen. Pl.* 1:187. 1891.

Small or medium tree, the branchlets ferruginous-tomentulose, lenticellate and angled or ridged. Leaves large, usually 10- or 12-foliolate; petioles mostly 2–4 cm. long, terete, rufous-tomentose; rachis almost 20 cm. long, tomentose like the petiole, conspicuously alate, the wing usually 5 or more mm. wide on each side of the rachis, bearing prominent, oval, cupuliform or patelliform glands between insertion of the petiolules, the glands broader than long; leaflets 3–6 pairs, apparently most commonly 5 or 6 pairs in Panama, ovate to elliptic, up to 15 cm. long and 5–7 cm. wide in terminal leaflets, usually about $\frac{1}{2}$ as large in basal leaflets,

acute and somewhat acuminate apically, mostly rounded basally, lightly tomentose below especially on the veins, sparsely appressed-pubescent above, the veins elevated and conspicuously reticulate below, conspicuous but not elevated above; stipules caducous, reported about 5 mm. long. Inflorescence generally of a few pedunculate spikes from the leaf axils, or often paniculate by insertion of such spikes at subterminal defoliate nodes; spikes mostly 6-8 cm. long, floriferous for the upper 2-3 cm., the flowers moderately congested; bracts ovate, about 5 mm. long, caducous in age. Flowers white, moderate; calyx turbinate, apparently 7-8 mm long in Panama, appressed short-pilose, the teeth regular and 1-2 mm. long; corolla tubular, almost 2 cm. long, relatively slender and little expanded apically, densely ascending-pilose, the lobes subequal and 2-4 mm. long; stamens mostly 4 cm. (or up to 5 cm.) long, the staminal tube slightly exerted; ovary glabrous, the style slightly exceeding the stamens. Legume as much as 1 m. long and up to 2 cm. wide or wider, ferruginous-tomentose, somewhat tetragonous or subterete, the margins almost entirely covering the faces.

Mexico to Panama; South America to middle Brazil.

BOCAS DEL TORO: Almirante, Cooper & Slater 38; Changuinola Valley, Dunlap 220; Chiriqui Lagoon, H. von Wedel 1000; Water Valley, H. von Wedel 1096.

This species is very variable, and the description given here is mostly drawn from the Panamanian material. Probably synonymous with *I. edulis* are *I. Endlichii* Harms and *I. latibracteata* Harms (ex char.), and possibly a number of other "species" which intergrade with this. The Panamanian specimens cited resemble more closely collections from South America (Amazon Valley) than most collections labeled *I. edulis* from northern Central America and Mexico. Evidently no well-established distinction between *I. edulis* and *I. spuria* has been apparent to most authors. Examination of all available specimens from Mexico to Brazil shows specimens, practically indistinguishable from each other, determined rather indiscriminately as either *I. edulis*, *I. spuria*, or even other species. *I. edulis* is here interpreted as having a more slender, less stocky corolla and a generally smaller calyx than *I. spuria*. The leaflets likewise appear significantly larger (especially wider) in *I. edulis* than in *I. spuria* (in Panama). The H. von Wedel specimens cited appear somewhat atypical (more leaflets; corolla more elongate).

14a. *INGA EDULIS* Mart. var. *minutula* Schery, var. nov.

Arbor foliis speciei similibus; inflorescentiis prominentibus, floribus specie multo brevioribus, bracteis obovato-oblancoatis, 3-4 mm. longis.

Ferruginous-tomentulose tree with large 6- to 10-foliolate leaves. Inflorescence of 1 to few pedunculate spikes 3-8 cm. long (floriferous portion 1-5 cm.) from either foliate or defoliate axils; bracts 3-4 mm. long; flowers small; calyx cinereous, appressed-pubescent, 4 mm. long; corolla cinereous, short-pilose, about 8 mm. long; stamens about 3 cm. long. Legume tetragonal-subterete, 15-20 cm. long, 10-15 mm. wide, brownish-tomentose, somewhat constricted between the seeds, the valves sulcate.

Panama; Honduras?

Fig. 81. *Inga edulis* var. *minutula*

BOCAS DEL TORO: Changuinola Valley, *Dunlap* 582. CANAL ZONE: Barro Colorado Island, *Zetek* 3578; *Kenoyer* 371; Gamboa, *Allen* 1972; Gorgona, *Pittier* 2696. DARIÉN: El Real, *Allen* 968 (Herb. Missouri Bot. Gard., TYPE).

This variety is well marked from the species by the considerably smaller flowers, and is perhaps worthy of specific rank except that it grades somewhat into both *I. edulis* and *I. Oerstediana*. It resembles *I. edulis* var. *grenadensis* Urb., but differs from that variety in the longer inflorescence and the obovate or oblanceolate bracts. The cinereous flower ordinarily serves to distinguish *I. edulis minutula* from *I. Oerstediana*.

15. *INGA SPURIA* H. & B. ex Willd. Sp. Pl. 4:1011. 1806.

Mimosa spuria Poir. in Lam. Encycl. Meth. Suppl. 1:40. 1810.

Fenillea spuria Ktze. Rev. Gen. Pl. 1:189. 1891.

Inga fissicalyx Pittier, in Contr. U. S. Nat. Herb. 18:213. 1916.

Small- to moderate-sized tree, the branchlets ferruginous-tomentose, becoming glabrous in age. Leaves moderate to large, with few to several pairs of leaflets;

petiole short, scarcely exceeding 1 cm., tomentose like the young branchlets, terete; rachis up to 15 cm. long, tomentose, conspicuously alate, bearing a small sessile, cupuliform or patelliform gland between insertion of the petiolules; leaflets 4-9 pairs (usually 6 or 7 pairs), ovate-lanceolate to narrowly obovate, the terminal ones 7-15 cm. long and 2-5 cm. wide, becoming progressively smaller downward, the basal pair usually only $\frac{1}{4}$ the size of the terminal pair, usually acute or slightly acuminate apically, commonly obtuse or narrowly rounded basally, slightly pubescent above, somewhat more heavily so below, the veins prominent below but not above; stipules broadly linear, a few mm. long. Inflorescence of 1-3 pedunculate spikes from each of several leaf axils, the spikes 4-12 cm. long, floriferous in the upper few cm., tomentose, the flowers subsessile to somewhat pedicellate, more or less congested, white; calyx tubular, 10-20 mm. long, 3-6 mm. broad, cinereous- or golden-tomentose, the lobes 3-5 mm. long; corolla usually close to 2 cm. long, pilose without, the lobes 4-5 mm. long and slightly flaring; stamens many, frequently 5-6 cm. long, the staminal tube invested by the corolla. Legume linear, reported up to 30 cm. long and 1.5 cm. wide, subterete or angled, fulvous-tomentose, the margins thickened and expanded over the faces.

Mexico to northern and eastern South America.

CANAL ZONE: Miraflores, P. White 79; Sabana of Panama, Pittier 2538; Trinidad River, Pittier 3973; Victoria Fill, Allen 1704. CHIRIQUÍ: Boquete, Davidson 823. COCLÉ: La Pintada, Hunter & Allen 518; Penonomé, Williams 137, 334. HERRERA: Ocu, Allen 4069. PANAMÁ: Chepo, Hunter & Allen 89; Juan Díaz, Allen 939; R. Las Lajas, Allen 1608; Las Sabanas, Standley 31825. VERAGUAS: Cañazas, Allen 160.

A very variable species, forming a vast complex from Mexico through northern South America. It intergrades with other (both doubtful or recognized) species and is difficult to delimit precisely. Single specimens of two extremes of this species may appear quite distinct; yet examination of many specimens will show all degrees of intermediacy and no clear-cut differences. Characters such as absolute calyx size, number and width of leaflets, presence or absence of pedicellar portion of calyx, etc., normally somewhat constant in most species, show little constancy or correlation in *I. spuria*. Three Mexican "species," *I. eriocarpha* Benth., *I. oophylla* Riley, and *I. sciadodendron* Harms, should probably be reduced to synonymy with *I. spuria* and likely combined to form a variety of the species. *I. xalapensis* Benth., of Mexico and Central America as far south as Costa Rica (fide Pittier), is also in all probability *I. spuria* or a variety of it, but it is not listed among the synonyms because the type has not been examined.

Two centers of divergence in this complex seem discernible. One apparently occurs in south-central Mexico, and may be typified as the "*I. eriocarpha* influence." Here the flowers are generally stockier, the leaflets broader, the corolla pubescence less rigid, the legume stout. This would constitute the "variety" above suggested, to which *I. eriocarpha* would bring the oldest name. All degrees of gradation occur to the "typical" *I. spuria*. The "*I. eriocarpha* influence" is particularly noticeable in Mexico and transitionally in Guatemala, but is little apparent in Panama. A

second less clear center of divergence seems to occur near Honduras or British Honduras. Here slender flowers, narrow and peculiarly veined leaflets, and slender legumes are the rule. This influence is probably felt in Panama as well as northern Central America and Mexico. In addition, throughout its range, other species, *I. edulis* particularly, tend to intergrade with *I. spuria*. As with a number of species of *Inga*, *I. spuria* is sometimes planted for coffee shade.

16. *INGA PAUCIFLORA* Walp. & Duchass. in *Linnaea* 23:746. 1850.

Small tree, the branchlets ferruginous-tomentose-hirsute. Leaves moderate, mostly 6- or 8-foliolate; petiole short, up to 1.5 cm. long, heavily pubescent like the branchlets, unwinged; rachis up to 8 cm. long, ferruginous-pubescent, alate (the wings, margin to margin, 4-10 mm. broad), bearing a small, sessile, cupuliform gland between insertion of the petiolules; leaflets mostly 3 or 4 pairs, elliptic or nearly so, the terminal pair up to 13 cm. long and 5 cm. wide, the basal pair up to 5 cm. long and 2 cm. wide, acute and often somewhat acuminate apically, subcuneate to rounded basally, appressed-pubescent above, villous-tomentose below especially on the prominent veins; stipules ovate, about 4 mm. long, pubescent, early caducous. Inflorescence 1-2 axillary or terminal pedunculate spikes, the peduncular portion up to 3 cm. long and ferruginous-pubescent, the floriferous portion about as long or slightly longer; bracts very small, short and broad, caducous. Flowers several, white; calyx broadly tubular, 8-10 mm. long, tomentulose, striate; corolla tubular, about 15 mm. long, pilose; stamens almost 4.5 cm. long, the staminal tube included; stigma capitellate. Legume (young) densely ferruginous hirsute-tomentose, terete, becoming sulcate? or possibly flattened? in age.

Panama.

CANAL ZONE: Ancon Hill, *Williams* 32; Barro Colorado Island, *Woodson & Schery* 969; Chiva-Chiva trail, *Piper* 5725. VERAGUAS: Santa Fé, *Allen* 4417.

The *Woodson & Schery* 969 specimen is in very young fruit. Judging from this immature fruit the specimen is likely not *I. eriocarpa*, *I. spuria* or similar species, although certainly the species grades into the *I. spuria* complex. The fruit of *I. pauciflora* has not been known. Bentham regarded *I. pauciflora* as a synonym of *I. vera*, and indeed a number of difficultly separable species might profitably be combined under that older name.

17. *INGA SAFFORDIANA* Pittier, in *Contr. U. S. Nat. Herb.* 18:176. 1916.

Small, slender tree, the branchlets dark setose-villous. Leaves large, 8- or 10-foliolate; petiole about 2.5 cm. long, terete, setose or sparsely villous; rachis up to 20 cm. long, unwinged, pubescent like the petiole, bearing long-stipitate glands above at the rachial nodes; leaflets 4 or 5 pairs, oblong to obovate-lanceolate, about 14 cm. long and 4 cm. wide in terminal pair (lowermost pair only $\frac{1}{4}$ - $\frac{1}{5}$ this size), tapered but blunt basally and inequilateral, acuminate apically, glabrous above, sparsely setose on the margins and veins below, the veins moderately prominent below, the lateral ones arcuate and subconfluent; stipules subulate, up to 12 mm.

long, setose-villous. Inflorescence axillary or borne on older defoliate wood, umbellate, pedunculate; peduncles up to 13 cm. long, villous-setose; pedicels similarly pubescent, almost 2 cm. long; floral bracts similar to the stipules, subsistent. Flowers incompletely known; calyx apparently 7-8 mm. long, setose-villous, the teeth elongate and narrow; corolla tubular, about 15 mm. long, setose-villous, especially apically. Legume broadly linear, about 30 cm. long and almost 3 cm. wide, cuneate basally, flat and thin, lightly margined, densely dark villous, about 18-seeded.

Panama.

DARIÉN: Sambú basin, Pittier 5676.

A distinctive species with unusual pubescence, long-stipitate rachial glands, and long-pedicellate, umbellate flowers.

18. *INGA MULTIJUGA* Benth. in Trans. Linn. Soc. 30:615. 1875.

Feuilléea multijuga Ktze. Rev. Gen. Pl. 1:188. 1891.

Tree to several m., the branchlets densely ferruginous-tomentulose. Leaves large, with a variable number of leaflets (5-10 pairs, fide N. Am. Fl.), 6-9 pairs in Panamanian specimens seen; petiole less than 2 cm. long, essentially terete, tomentulose like the branchlets; rachis up to 2 dm. long, similar to the petiole, not winged, bearing a sessile, cupuliform gland 1-2 mm. in diameter between insertion of the petiolules; leaflets few to several pairs, oblong or elliptic to occasionally ovate-lanceolate, mostly about 10 cm. long and 3-4 cm. broad in the terminal leaflets, $\frac{1}{2}$ or less this size in the lowermost leaflets, acute or short-acuminate apically, rounded or obtuse and somewhat inequilateral basally, lightly strigose-puberulent or subglabrate above, rather densely pubescent and paler below; stipules apparently ovate, about 2 mm. long, caducous. Inflorescence of pedunculate spikes up to 6 cm. long, solitary, geminate or fasciculate from the axils of the leaves, the floriferous portion scarcely 2 cm. long; bracts ovate, very small, ferruginous-tomentose like the axis. Flowers congested, spicate on the axis, whitish; calyx tubular, up to 12 mm. long (reported as short as 5 mm. in Guatemalan and Costa Rican specimens), usually cleft on one side for as much as $\frac{1}{3}$ its length, puberulent or tomentulose without, the teeth minute; corolla elongate, tubular, 20-25 mm. long, appressed-villous without, the lobes about 2 mm. long; stamens many, almost 4 cm. long, united below into a tube about equalling the corolla; style somewhat exceeding the stamens, the stigma expanded. Legume variously reported glabrous or tomentulose?, flat or subterete?, up to 25 cm. long and 1 cm. wide?, the valves expanded and costate at the edges.

Honduras to Panama.

CANAL ZONE: Barro Colorado Island, *Bangham* 528; "Chagres," *Fendler* 51; Margarita Swamp, *Maxon & Valentine* 7058. VERAGUAS: Cañazas, *Allen* 154.

The usual concept of this species seems to include a remarkably variable group of specimens. Certainly various authors have been at great divergence in writing

descriptions of it, and specimens seen show great differences in leaflet number, calyx size, etc. Dimensions given by Pittier (Contr. U. S. Nat. Herb. 18:187) for the *Fendler 51* specimen at the Gray Herbarium in no way approximate those for *Fendler 51* at the Missouri Botanical Garden. Yet in spite of such lack of constancy the species seems to form an unit distinguishable from most other *Ingas* within its range (especially by the large, elongate corolla, the several pairs of leaflets, the wingless rachis, and the spicate inflorescence).

19. *INGA COCLEENSIS* Pittier, in Contr. U. S. Nat. Herb. 18:211. 1916.

Tree, the branchlets densely dark rubiginous-tomentose. Leaves large, 12-foliolate; petiole about 2.5 cm. long, terete, tomentose like the branchlets; rachis about 16 cm. long, unwinged, pubescent like the petiole, bearing above at insertion of the petiolules a large, sessile, oval, concave gland; leaflets 6 pairs, mostly elliptic-lanceolate, the terminal ones about 13 cm. long and 4 cm. wide, the basal pair somewhat smaller, rounded or obtuse basally, acute and somewhat acuminate apically, rather coarsely short-pubescent above except tomentose on the costa, tomentose below, the veins elevated below and slightly impressed above, reticulate; stipules not known. Inflorescence of axillary pedunculate spikes; peduncle 4-5 cm. long, tomentose like the branchlets; floriferous portion thick, about 4 cm. long, the bracts caducous. Flowers sessile; calyx tubular, 6-7 mm. long, rubiginous-pubescent; corolla not known. Legume (immature) slender, terete by thickening of the margins, longitudinally sulcate, ferruginous-tomentose, twisted.

Panama.

COCLÉ: Bismarck, Williams 405.

The species is known only from a broken fragment found on the ground, including one complete leaf and two or three immature fruits. A photograph of the type shows resemblance to the rather hazily defined *I. multijuga*, of which further collections may prove *I. cocleense* to be a synonym.

20. *INGA RUIZIANA* G. Don, Gen. Hist. Dichl. Pl. 2:391. 1832.

Inga sagifolia G. Don, loc. cit. 391. 1832, non Willd., fide Benth.

Inga foliosa Benth. in Hook. Jour. Bot. 4:597. 1845.

Feuilléea Ruiziana Ktze. Rev. Gen. Pl. 1:189. 1891.

Inga confusa Britt. & Rose, in N. Am. Fl. 23:5. 1928.

Tree to 20 or more m., the branchlets conspicuously lenticellate and ferruginous-puberulent towards the tip. Leaves large, even-pinnate, generally 12-foliolate; petioles 1-2 cm. long, terete or nearly so, ferruginous-puberulent, swollen basally; rachis about 15 cm. long, like the petiole except margined laterally above, bearing disc-like, sessile, generally depressed glands 1-2 mm. in diameter between insertion of the petiolules; leaflets usually 6 pairs, mostly elliptic, the uppermost often obovate-elliptic and up to 25 cm. long and 8 cm. broad, the lowermost usually only $\frac{1}{3}$ or $\frac{1}{4}$ this size and somewhat ovate, short-acuminate apically, obtuse and somewhat inequilateral basally, the veins prominently reticulate and

Fig. 82. *Inga Ruiziana*

puberulent below, lightly indented above, the leaflet subglabrous and drying darker above; stipules caducous. Inflorescence terminal and subterminal, tomentulose, of 2-3 pedunculate spikes fasciculate from each of several nodes or axils, the spikes 3-4 cm. long, the floriferous portion ovate and about 1 cm. long. Flowers congested, white, subsessile; calyx subturbinate, 3-4 mm. long, contracted gradually baseward, densely puberulent; corolla 7-8 mm. long, strigose-puberulent; stamens many; filaments almost 2 cm. long, united below for at least half their length, the tube slightly exceeding the corolla; anthers minute. Legume reported 10-15 cm. long and 2-2.5 cm. wide, flat, rounded apically and basally, somewhat pubescent, the margins elevated.

Nicaragua to Peru and Brazil.

CANAL ZONE: Gamboa, *Pittier* 6520; Peluca Hydrographic Station, *Steyermark & Allen* 17271; Quebrada Salamanca, *Dodge, Steyermark & Allen s. n.* (1934). COLÓN: R. Fato, *Pittier* 3917. DARIÉN: Marraganti, *Williams* 768; Sarnú River, *Pittier* 5533. BOCAS DEL TORO: Chiriquí Lagoon, *H. von Wedel* 2012, 2677; Water Valley, *H. von Wedel* 844.

Although the type of the species is unavailable for examination, various descriptions and keys are precise enough to indicate *I. confusa* Britt. & Rose as synonymous with *I. Ruiziana* G. Don. Certainly herbarium material of the two species appears identical.

21. *INGA MICROSTACHYA* Britt. & Killip, in *Ann. N. Y. Acad. Sci.* 35:115. 1936.

Unarmed tree, the branchlets fulvous-puberulent when very young, soon becoming glabrous or subglabrous, very pronouncedly raised white-lenticellate, somewhat flexuous, subangulate below the nodes because of decurrent ridges from the axils. Leaves large, the leaflets 4 or 5 pairs opposite on the rachis; petioles mostly 1–2 cm. long, terete except briefly ridged laterally, subglabrous or lightly puberulent; rachis up to 12 or more cm. long, unwinged but ridged laterally especially below the foliolar nodes, sulcate above, puberulent to subglabrous, bearing a prominent, sessile, cupulate gland at insertion of each pair of leaflets; leaflets mostly elliptic-lanceolate, up to 18 cm. long and 7 cm. wide in the larger (terminal) leaflets, the basal leaflets perhaps one-third as long and wide, acute-acuminate apically, inequilaterally acute or obtuse basally, glabrous and lustrous above, the venation visible but not as prominent as below, glabrous below except often puberulent on the main veins, the venation prominently reticulate; stipules linear, early caducous. Inflorescence of fasciculate clusters of pedunculate spikes from terminal (immaturely foliate) and subterminal axils; peduncles 2–5 cm. long, puberulent or tomentulose; spikes short, 1–2 cm. long, the floral bracts minute. Flowers sessile, moderately congested; calyx cupulate, slightly less than 2 mm. long, puberulent, the lobes irregular; corolla funnelform-cylindric, about 4 mm. long (in Panama), puberulent at least apically; staminal tube about equalling the corolla; ovary oblong, short, compressed, glabrous except for a few setae marginally. Legume not known, but presumably flat.

Panama and Colombia.

CANAL ZONE: Fort Sherman Military Reservation, *Maxon & Valentine* 6079.

This species, a new record for Panama, somewhat resembles both *I. Ruiziana* and *I. punctata* of that country, but it lacks the obovate terminal leaflets of the former and possesses more (4–5 pairs) leaflets than the latter (2–3 pairs). Its exact relationships with South American species such as *I. nobilis* Willd., *I. lenticellata* Benth., *I. Caldasiana* Britt. & Killip, and others which it resembles, awaits work of the monographer.

22. *INGA ROUSSOVIANA* Pittier, in Contr. U. S. Nat. Herb. 18:175. 1916.

Inga Schippii Standl. in Field Mus. Publ. Bot. 11:132. 1932.

Small tree, the branchlets ferruginous-lenticellate and puberulent towards the tips. Leaves moderately large, mostly 6-foliolate; petioles usually 1-2 cm. long although reported up to 4 cm. long, subterete, puberulent or subglabrous; rachis mostly about 7 cm. long but often longer or shorter, flattened and margined above, lightly ferruginous-puberulent to glabrous, bearing small, knob-like, concave glands between insertions of the petiolules (the glands variable in shape and size, infrequently suppressed); leaflets 2-4 (usually 3) pairs, generally oblong or elliptic, the uppermost somewhat obovate, up to 18 cm. long and 3-7 cm. wide, the lowermost only about $\frac{1}{3}$ as large, broadly or narrowly cuneate basally, blunt to short-acuminate apically, glabrous except occasionally on veins below, the veins very prominent below, less so above; stipules reported ovate, about 5 mm. long, ferruginous-tomentose, caducous. Inflorescence a terminal or subterminal panicle shoot, the peduncled umbels 1 to few from the defoliate nodes; the bracts and axis ferruginous-tomentose; peduncles 1-2 cm. long; flowers whitish, umbellate from the tip of the peduncle on prominent pedicels usually 4-5 mm. long. Flowers several in each umbel, whitish; calyx turbinate-subcampanulate, 3-6 mm. long, expanded upward, hirsute-tomentose; corolla about 9 mm. long, hirsute-villous without, the teeth about 2 mm. long; stamens about 18 mm. long, united below into a tube about 1 cm. long. Legume linear-oblong, up to 17 cm. long and 2.2 cm. wide, apiculate, rounded basally and stipitate, flat, ferruginous-tomentulose, prominently margined.

British Honduras and Guatemala to Panama; Colombia?

BOCAS DEI TORO: Changuinola Valley, Stork 272; Cooper & Slater 13. CANAL ZONE: Barro Colorado Island, Bailey & Bailey 270; R. Chagres, Steyermark & Allen 16781; France Field, Standley 30325. CHIRIQUÍ: San Felix, Pittier 5270.

The Canal Zone specimens have smaller flowers and shorter pedicels than is usual for the species, and probably represent intergradation towards *I. Williamsii* Pittier, a species of doubtful specific distinction. *I. santanderensis* Britt. & Killip (in Ann. N. Y. Acad. Sci. 35:114), of Colombia, is probably nothing more than a robust form of *I. Roussoviana*, but having seen no specimens of the former other than the type I cannot pass judgment on the constancy of this difference. The type of *I. Schippii*, also with a more robust calyx than is typical of *I. Roussoviana*, is nevertheless linked by a series of intergrading specimens.

23. *INGA WILLIAMSII* Pittier, in Contr. U. S. Nat. Herb. 18:176. 1916.

Small tree, the branchlets ferruginous-lenticellate and puberulent towards the tips. Leaves moderate, mostly 6-foliolate; petioles about 2 cm. long, subterete, puberulent; rachis mostly 6 or 7 cm. long, puberulent like the petiole, flattened and margined above, bearing small glands between insertions of the leaflets or the glands partly or wholly suppressed; leaflets usually 3 pair, more or less elliptic, the upper-

most up to about 12 cm. long and 4 or 5 cm. wide, the lowermost only $\frac{1}{4}$ as large, subcuneate basally, acute to emarginate apically, glabrous except on the veins below, the veins very prominent below, not elevated above; stipules reported lanceolate, variable in size, caducous. Inflorescence a terminal or subterminal paniculate shoot or reduced to only 1 or a few pedunculate umbels from the defoliate nodes, ferruginous-tomentose; peduncles 1-2 cm. long; pedicels 1-2 mm. long, arising more or less in umbellate or subcapitate fashion from the tip of the peduncle. Flowers whitish; calyx about 4 mm. long, densely pubescent without; corolla short, typically 6 or 7 mm. long, villous-tomentose without; staminal tube scarcely exerted, the filaments about 15 mm. long. Legume linear-oblong, up to 10 cm. long, about 2 cm. wide, arcuate, flat but thick, densely ferruginous-tomentose when young.

Panama; Colombia?

CANAL ZONE: Barro Colorado Island, Wetmore & Abbe 101; Bangham 512; Zetek 3929; R. Chagres, Dodge & Allen 17409. COLÓN: Bismarck, Williams 285.

This species seems to differ from *I. Roussoviana* almost solely in having notably shorter pedicels, and it probably should constitute but a variety of that species. We hesitate, however, to make this reduction until accumulation of more material can prove the frequency of intergradation. *I. Mutisii* Britt. & Killip (Ann. N. Y. Acad. Sci. 35:114) of Colombia, with leaflets up to 22 cm. long, is apparently just a more robust form of *I. Williamsii*.

24. *INGA gigantifoliola* Schery, sp. nov.

Arbor ramulis glabris lenticellatis; foliis permagnis plerumque 3-jugatis, petiolis aliquanto elongatis ca. 8 cm. longis teretibus exalatis glabris, rhachibus elongatis ad 20 cm. longis, exalatis, glandulam interfoliolarem disciformem sessilem, ornatis; petiolulis ca. 5 mm. longis; foliolis ovato-ellipticis ellipticisve, 13-40 cm. longis, 7-14 cm. latis, abrupte angustatis acuminatisque, basi late subcuneatis, stipulis non visis; inflorescentia spicibus tenuibus 1 vel paucibus ex axi, parte pedunculari ca 5 mm. longo, parte florifero ca. 5 mm. longo, bracteis minutis; floribus subsessilibus albis; calyce tubulati-cupuliformi, ad 2.5 mm. longo, glabro, estriato apice undulato; corolla tubulati-infundibuliformi, ad 9 mm. longa, subglabra; staminibus ad 2 cm. longis, tubo aliquanto exserto; ovario glabro, multiovulato; leguminibus verisimiliter planis glabris.

Small or moderate tree, more or less glabrous throughout, the branchlets lenticellate. Leaves very large, 6- (sometimes 4?-) foliolate; petiole elongate, almost 8 cm. long, terete and unwinged, lenticellate, glabrous, callous at the extreme base; rachis up to 20 cm. long, terete and unwinged like the petiole, bearing an inconspicuous, flat, sessile gland between insertion of the petiolules; petiolules about 5 mm. long, callous, glabrous; leaflets mostly 3 pairs, elliptic or ovate-elliptic, 13-40 cm. long and 7-14 cm. wide, rather abruptly narrowed apically into an acumen 1-2 cm. long, similarly contracted basally into a short subcuneate base, completely glabrous, the veins somewhat impressed above and elevated below, chartaceous;

Fig. 83. *Inga gigantifolia*

stipules not present. Inflorescence 1 to few, of very short, axillary, pedunculate spikes (sometimes borne on older, defoliate branches?), the peduncular portion about 5 mm. long and lightly puberulent, the floriferous portion about 5 mm. long also; bracts triangular-lanceolate, minute. Flowers small, white, scarcely pedicellate; calyx tubular-cupular, about 2.0–2.5 mm. long, subglabrous without, not striate, sometimes cleft to one side but otherwise the teeth broader than tall and the rim

appearing more or less undulate; corolla funnelform-tubular, 8-9 mm. long, subglabrous, the lobes 1-2 mm. long; stamens up to 2 cm. long, the staminal tube briefly exerted; ovary turgid-quadrangular, glabrous, multiovulate. Legume not known in type specimen, probably linear-oblong, flat, glabrous, the margins little thickened.

Panama; South America?

BOCAS DEL TORO: Fish Creek Mts., *H. von Wedel* 2349 (Herb. Missouri Bot. Gard., TYPE).

The species would fall into the section *BOURGONIA* of the genus as interpreted by Pittier following Benth. It is quite distinctive from most species in the extremely large leaflet size.

The type specimen appears identical in many respects with the Amazonian (Rio Solimoes) 7th Krukoff Expedition specimens, *Krukoff* 8215 and 8228. The Krukoff material in flower (8215) and fruit (8228) was found undetermined in the herbarium; the flowers were of slightly smaller dimensions, pronouncedly more pedicellate, and the calyx slightly more elongate than in the Panamanian material. Nevertheless, similarity in leaflet, inflorescence and floral structure would seem to indicate that the Krukoff material has close affinities with the Panamanian specimen. In any event the Amazonian material supports the belief that, in spite of the separation of the inflorescence from the leaves in the *H. von Wedel* specimen, flower and branch are both from the same plant; and that similarity in ovary structure between *H. von Wedel* 2349 and *Krukoff* 8215 may indicate that the fruit of the Panamanian specimen would at least somewhat resemble that of *Krukoff* 8228.

25. *INGA PUNCTATA* Willd. Sp. Pl. 4:1016. 1806.

Mimosa sericea Poir. in Lam. Encycl. Meth. Suppl. 1:42. 1810.

Inga leptoloba Schlecht. in Linnaea 12:560. 1838.

Inga punctata var. *panamensis* Benth. in Trans. Linn. Soc. 30:613. 1875.

Feuillécia punctata Ktze. Rev. Gen. Pl. 1:188. 1891.

Inga punctata chagrensis Pittier, in Jour. Dept. Agr. Porto Rica 13:135. 1929.

Small or moderate tree to 15 m., the branchlets strigose-puberulent and markedly lenticellate. Leaves moderately large, pinnate, 4- to 6-foliolate; petioles 2-4 cm. long, terete or nearly so, puberulent like the branchlets, swollen-callous basally; rachis similar to and (the internodes) about as long as or slightly longer than the petiole, wingless, bearing disc-like or subconic glands between insertions of the petiolules (or these glands in part or entirely suppressed in some specimens); leaflets 2 or 3 pairs, elliptic to ovate, acuminate, those of the apical pair larger, up to 20 cm. long and 9 cm. wide, those of the lowermost pair usually about half as long and broad, strigose-puberulent on both surfaces; stipules linear-lanceolate, 3-4 mm. long, caducous. Inflorescence an axillary, subterminal, paniculate or corymbiform branch, the secondary spicate peduncles umbellate from the nodes, or sometimes the spikes fasciculate or simple-umbellate directly from the axil; spikes short, the floriferous portion scarcely more than 1 cm. long, the many flowers densely

congested. Flowers sessile, whitish; calyx subturbinate, 3–5 mm. long, the 5 teeth conspicuous but only about 0.5 mm. long, puberulent without; corolla tubular, somewhat expanded above the calyx, 7–9 mm. long, the lobes about 1 mm. long, pubescent without; stamens many, the filaments almost 2 cm. long in age, united into a tube for about $\frac{1}{2}$ their length, glabrous, the anthers minute, bilocular, only a fraction of a mm. long; ovary and style glabrous. Legume linear-oblong, about 13 cm. long and 2.5 cm. wide, slightly arcuate, lightly pubescent, flattened, somewhat margined, apparently indehiscent.

Mexico and Central America to the Amazon Valley and Peru; Tobago.

BOCAS DEL TORO: Changuinola Valley, Cooper & Slater 73; Chiriquí Lagoon, H. von Wedel 1069, 1230, 2357, 2387. CANAL ZONE: Barro Colorado Island, Zetek 3837, 3847, 3867; "Chagres," Fendler 89; R. Chagres, Steyermark & Allen 16778; Gatún, Goldman 1865; Hayes 55. CHIRIQUÍ: Boquete, Davidson 814. COCLÉ: El Valle de Antón, Allen 3700. COLÓN: R. Culebra, Pittier 4161. DARIÉN: El Real, Allen 966; Pinogana, Allen 4281. PANAMÁ: Chepo, Hunter & Allen 95. VERAGUAS: near Soná, Woodson, Seibert & Allen 486.

Inga leptoloba has been retained as a species distinct from *I. punctata* by most authors (Benthams, Britton & Rose, etc.), and Standley (Flora Guatemala) lists it as doubtfully distinct. Benthams's distinction between *I. leptoloba* and *I. punctata* is not clear, while Britton & Rose and Standley separate the two species on the basis of bifoliolate leaves in the latter vs. trifoliolate leaves in the former. However, many specimens occur with both bi- and tri-foliolate leaves on the same plant, and no supporting or correlating characters are apparent to strengthen this demarcation. Both bi- and tri-foliolate specimens exhibit the same range of variability in rachial gland structure, flower size, and type of inflorescence, and none of the vegetative distinctions mentioned by Pittier (Contr. U. S. Nat. Herb. 18:187) exhibit constancy when large numbers of specimens are examined. Thus it seems most practical to unite these two names as a single species, or at least reduce *I. leptoloba* to varietal status under *I. punctata*.

26. *INGA LAURINA* (Sw.) Willd. Sp. Pl. 4:1018. 1806.

Mimosa sagifolia Jacq. Stirp. Amer. Hist. 1:264, t. 164. 1763, non L., fide Benth.

Mimosa laurina Sw. Prodr. Veg. Ind. Occ. 85. 1788.

Feuilléea laurina Ktze. Rev. Gen. Pl. 1:184. 1891.

Moderate-sized tree, the branchlets glabrous and markedly lenticellate. Leaves moderate-sized, usually 4- (or sometimes 6-, or reported occasionally 2-) foliolate; petiole 1–2 cm. long, terete except angled laterally above, glabrous; rachis 2–5 cm. long, glabrous, wingless but ridged and somewhat marginate laterally above, bearing a small, sessile, disc-like or subcupuliform gland between insertion of the petiolules; leaflets usually 2 pairs, sometimes 3 or 1? pair, mostly oblong or elliptic, 4–12 cm. long and 1.5–5.5 cm. wide, usually acute and bluntly acuminate apically, cuneate and slightly inequilateral basally, glabrous above and below; stipules linear-oblong, up to 5 or 6 mm. long, pubescent, subpersistent or caducous. Inflorescence of 1 or 2 elongate spikes from each of a number of foliate or defoliate axils; spikes

subglabrous, about 10 cm. long, the peduncular portion only about 2 cm. long, the many flowers scattered over the remaining floriferous portion. Flowers whitish, glabrous to puberulent; calyx cupuliform-tubular, 1-2 mm. long, the teeth minute but distinct; corolla usually 4-5 mm. long, narrowed basally, expanded apically, subglabrous; stamens 12-15 mm. long, fused basally into a tube greatly and noticeably exceeding the corolla (Panama?) or only slightly exceeding the corolla. Legume reported flat and strongly compressed, 7-15 cm. long and 2-3.5 cm. wide, subglabrous, the margins thickened.

Mexico to Panama; West Indies.

CANAL ZONE: Barro Colorado Island, *Bangham* 547. CHIRIQUÍ: Boca Chica, *Pittier* 5119. COCLÉ: Bismarck, *Williams* 532. HERRERA: Ocu, *Allen* 4037. PANAMÁ: Capira, *Allen* 1688; R. Pacora, *Allen* 817.

As with most species of the genus, *I. laurina* exhibits variability, noticeable here especially in length of the staminal tube relative to the corolla. In fact, certain specimens are almost identical with respect to the elongate staminal tube to South American material generally accepted as *I. fagifolia* Willd. Bentham (Trans. Linn. Soc. 30:608) considered the elongate staminal tube, along with a more pronouncedly bordered rachis and a fruit difference, as distinguishing *I. fagifolia* from *I. laurina*. Panamanian (and Mexican) material could sometimes be considered either of these two species, leading us to believe that combining these names (and probably that of *I. cylindrica* (Vell.) Mart. also) might eventually prove in order. In Panama, *I. laurina* (regarding *I. fagifolia* as a separate species not occurring there) is fairly readily delimited from other species except *I. marginata* by distinctive leaflet appearance and the elongate, relatively lax spikes. *I. coruscans* H. & B. ex Willd., of northern South America, resembles *I. laurina* except for the leaflet which is like that of *I. marginata*.

27. INGA CALDASIANA Britt. & Killip, in Ann. N. Y. Acad. Sci. 35:115. 1936.

Forest tree to 20 m., the branchlets glabrous or subglabrous, prominently lenticellate, the lenticels and bark reddish-brown. Leaves large, normally 6-foliolate, the basal pair of leaflets sometimes caducous, occasionally only one member of the terminal pair present; petiole short, at most 1.5 cm. long, the lower portion swollen and callous, glabrous or sparsely puberulent above; rachis usually 6-8 cm. long, unwinged but frequently slightly marginate below the apical leaflets and somewhat angled above, subglabrous, bearing between insertion of the petiolules a sessile, patelliform gland about 1 mm. in diameter; leaflets elliptic or nearly so, about 15 cm. long and 6-7 cm. wide, the basal leaflets somewhat smaller, abruptly narrowed and short-acuminate apically, cuneate or subcuneate basally, glabrous except perhaps minutely puberulous on the costa; petiolules 2-3 mm. long, callous, puberulous; stipules linear-oblong, usually 8-12 mm. long, puberulous. Inflorescence of 1 to few axillary, short-pedunculate spikes, the peduncular portion less than 2 cm. long, the floriferous portion puberulent and as much as 10 cm. long but usually about 6 cm. long; bracts subtending the flowers minute, sublinear and ascending-expanded apically. Flowers moderately lax, sessile, white; calyx cupular,

less than 1 mm. long, puberulent; corolla tubular-funnelform, about 4 mm. long, subglabrous except canescent-puberulent at tips of the lobes; stamens 1 cm. long or slightly longer, the staminal tube exserted 2-3 mm. beyond the corolla; ovary oblong, compressed, glabrous; style truncate, exserted beyond the stamens. Legume not known.

Colombia and eastern Panama.

DARIÉN: Yavisa, Allen 4585.

The Panamanian specimen cited matches fairly well the type of *I. Caldasiana*, and as this species it constitutes a new record for Panama. *Lawrance* 784 from Boyaca, Colombia, is probably likewise *I. Caldasiana* and not *I. marginata* as found labeled in the herbarium. The inflorescence and flowers of *I. Caldasiana* might well be *I. marginata* or *I. laurina*, but it is hard to reconcile the leaf with either of these species. The unwinged, scarcely marginate leaf rachis and large leaflet size are unlike *I. marginata*, and the much larger leaflet and large stipule-like bracts are unlike *I. laurina*. Also similar to *I. Caldasiana* are the South American species *I. Klugii* Standl. ex Macbride and *I. Bourgoni* (Aubl.) DC.

28. *INGA MARGINATA* Willd. Sp. Pl. 4:1015. 1806.

?*Inga sapida* HBK. Nov. Gen. & Sp. 6:286. 1824.

Mimosa semialata Vell. Fl. Flum. Ic. 11:t. 5. 1827.

Inga guayaquilensis G. Don, Gen. Hist. Dichl. Pl. 2:391. 1832, fide Benth.

Inga odorata G. Don, loc. cit. 388. 1832, ex char. fide Benth.

Inga excelsa Poepp. & Endl. Nov. Gen. & Sp. 3:78. 1845, fide Benth.

Inga puberula Benth. in Hook. Lond. Jour. Bot. 4:589. 1845.

Inga pycnostachya Benth. loc. cit. 1845.

Feuillécia marginata Ktze. Rev. Gen. Pl. 1:188. 1891.

Moderate-sized tree to 10 or 15 m., the branchlets glabrous, lenticellate. Leaves moderate, 4-foliate; petiole short, usually about 1 cm. long, marginate or alate apically, terete and callous basally; rachis 2-4 cm. long, usually prominently alate, the wing broadest apically, bearing a sessile, patelliform gland between insertion of the petiolules; leaflets 2 pairs, narrowly elliptic or elliptic-lanceolate, sharply acuminate apically, cuneate and somewhat inequilateral basally, the terminal pair up to 15 cm. long and 2-5 cm. wide, the basal pair about $\frac{2}{3}$ as large, essentially glabrous above and below; stipules linear, about 5 mm. long, caducous. Inflorescence of 1 to few spikes from the leaf axils, the spikes up to 10 cm. long and laxly floriferous for all except the lower several mm., glabrous or lightly puberulent. Flowers sessile, whitish; calyx campanulate or short-tubular, scarcely more than 1 mm. long, somewhat puberulent, the teeth prominent; corolla subfunneliform, 3-4 mm. long, gradually constricted basally, essentially glabrous; stamens about 12 mm. long, the staminal tube exserted 1-2 mm. beyond the corolla. Legume up to 12 cm. long and 1.5 cm. wide, flat, thickened about the seeds, lightly margined.

Costa Rica, Panama, northern South America.

BOCAS DEL TORO: Changuinola Valley, *Dunlap* 282; Chiriquí Lagoon, *H. von Wedel* 1378, 1549, 1807. CANAL ZONE: Barro Colorado Island, *Zetek* 24322; Gatún Valley, *Pittier* 6512. COCLÉ: El Valle, *Allen* 2231. DARIÉN: Sambú River, *Pittier* 5579.



Fig. 84. *Inga marginata*

SPECIMENS OF UNCERTAIN STATUS

The Allen 17282 (Canal Zone: R. Pequení), in very young bud, lacking both fruit and corolla, had been filed in the Missouri Botanical Garden herbarium as *Inga panamensis* Seem. Such determination would seem decidedly incorrect. In Pittier's treatment of *Inga* (Jour. Dept. Agr. Porto Rico 13. 1929) the plant would likely fall into section LEPTINGA, with affinities near *I. portobellensis* Beurling, and may be that species. However, accurate comparisons cannot be made because of the incompleteness of the specimen, and its exact status must remain in doubt.

Two sterile specimens labeled *Inga edulis*, collected by James Zetek (No. 3907 from Barro Colorado Island, and No. 3927 from near Chorrera, Panamá), appear different, as judged by leaf alone, from any species listed from Panama. It is impossible to give an exact determination to such sterile material, and unless dupli-

cates occur showing floral characters the specimens mentioned will have to remain indecisively located as to species.

NAMES OF UNCERTAIN APPLICATION, POSSIBLY EMBRACING PANAMANIAN SPECIES

INGA LINDENIANA Benth. in Hook. Lond. Jour. Bot. 4:608. 1845.

This species has been restricted by Pittier and Britton and Rose to the type, from Teapa, Mexico. Bentham, however, had considered *I. mucuna* a synonym of this name and the species to be represented in Panama by Fendler and Duchassaing specimens. We have not had opportunity to examine either the type or these specimens.

INGA VERA Willd. Sp. Pl. 4:1010. 1806.

Inga Inga Britton, Fl. Bermuda, 170. 1918.

This species has apparently been thoroughly confused with *I. spuria* and related species. Bentham regarded *I. pauciflora* as synonymous with *I. vera*, with a distribution of the species in the West Indies, Central America and northern South America. Pittier later considered *I. vera* confined to the West Indies, and reestablished *I. pauciflora* as a continental species. Recent floras of Colombia, Costa Rica, and Guatemala fail to list *I. vera*: hence we include *I. pauciflora* but not *I. vera* as occurring in Panama (see discussion of *I. pauciflora*).

2. PITHECOLOBIUM¹ Martius

PITHECOLOBIUM Mart. Hort. Reg. Monac. 188. 1829, as *Pitbecollobium* nom. conserv.

Zygia P. Browne, Nat. Hist. Jamaica, 279, t. 22, f. 3. 1756.

Spiroloba Raf. Sylva Tellur. 119. 1838.

Cathormion Hassk. Retzia, 231. 1855.

Feuilléea Ktze. Rev. Gen. 1:182. 1891, in part.

Siderocarpus Small, in Bull. N. Y. Bot. Gard. 2:91. 1901, homonym.

Havardia Small, loc. cit. 1901.

Samanea Merrill, in Jour. Wash. Acad. 6:46. 1916.

Abarema Pittier, in Trab. Mus. Com. Venezuela 2:86. 1927.

Jupunba Britt. & Rose, in N. Am. Fl. 23:24. 1928.

Punjuba Britt. & Rose, loc. cit. 28. 1928.

Cojoba Britt. & Rose, loc. cit. 29. 1928.

Ebenopsis Britt. & Rose, loc. cit. 33. 1928.

Painteria Britt. & Rose, loc. cit. 1928.

Chloroleucon Britt. & Rose, loc. cit. 36. 1928.

Pseudosamanea Harms, in Bot. Gart. Berlin Notizbl. 11:54. 1930.

Arthrosamanea Britt. & Rose, in Ann. N. Y. Acad. Sci. 35:128. 1936.

Macrosamanea Britt. & Rose, loc. cit. 131. 1936.

¹The genus is written *Pitbecollobium*, *Pithecollobium* or *Pitbecolobium*. The spelling *Pitbecollobium*, although lacking priority, has been followed by most authors, including Bentham, Engler & Gilg, Index Kew., Standley, Ducke, Macbride and many others. Pittier and a few others have followed Martius' later alteration of the original spelling, *Pithecollobium*. Merrill and Britton & Rose have used the original spelling *Pitbecollobium*, and the genus has been so listed in the conserved name list of the International Rules of Botanical Nomenclature. On the basis of general acceptance and simplicity we follow here the spelling *Pitbecollobium*.

Trees or shrubs, unarmed or, less frequently, armed with stipular spines or thorns, the branchlets usually puberulent or tomentulose and lenticellate. Leaves small or large, except in very few species ("*Cojoba*") bipinnate, the pinnae 1 to several pairs opposite on the rachis; leaflets 1 to many pairs opposite on the pinnular rachis (except frequently basal pair alternate or one leaflet of pair aborted); petiole unwinged, usually short, rarely bearing a gland on the upper side; rachis similar to the petiole, generally bearing a gland at insertion of each pair of pinnae; pinnular rachis usually similarly glandular, the glands commonly cupulate; leaflets 2 to many per pinna, small or large, entire, usually inequilateral, seldom heavily pubescent above; stipules minute or of prominent spines or thorns. Inflorescence of 1 to several axillary or supra-axillary, lateral or subterminal, pedunculate (rarely sessile) heads or spikes; floral bracts minute or conspicuous. Flowers pentamerous, sessile or rarely pedicellate, almost invariably whitish; calyx campanulate to tubular, pubescent or subglabrous, valvate, shallowly dentate; corolla tubular to funnellform, generally elongate, valvate, frequently tomentulose on the 5 lobes; stamens many, united below into a staminal tube included in or exceeding the corolla; ovary glabrous or pubescent, sessile or stipitate. Legume moniliform, compressed or flat, subcircinate, arcuate or almost straight, normally dehiscent, the valves often twisting after dehiscence; seeds often imbedded in pulp.

Tropics and subtropics of New World; one section (*CLYPEARIA* of Benth.) Far Eastern.

This predominantly New World genus exhibits great variability and has been a temptation to authors favoring segregation. A few of the segregate genera, for example, *Samanea* Merrill (Jour. Wash. Acad. 6:46. 1916), have little in common with *Pithecolobium* in general, and offer a case for establishment of separate (usually monotypic) genera. In the case of *Samanea*, Merrill argues his point well and convincingly, but fails to consider the results were each equally divergent species or grouping of species so accorded separate recognition. It is difficult enough to attempt to distinguish *Pithecolobium* from long-established genera of the MIMOSOIDEAE, such as *Calliandra*, *Albizzia*, etc., without adding confusion in the form of numerous segregates such as Britton and Rose have proposed. It is often nearly impossible to find into which of such segregate genera a species falls, and the key to these genera is impossible to work.

Unfortunately, segregations of even universally recognized genera in the MIMOSOIDEAE have been made chiefly on the basis of legume characters. Many specimens, of course, are not in fruit, and such specimens often resemble one genus as much as another. Thus determination often becomes a hit-or-miss matching of specimens. I am led to wonder whether legume characters would not have failed in many generic delimitations had sufficient fruiting specimens been on hand to exhibit variability and degrees of intergradation. Certainly, in Panama, consideration of *Pithecolobium* in a broad sense brings together in one "pigeon-hole" many diverse species which can then be comparatively easily keyed out on vegetative and floral characters.

- a. Leaves once-pinnate; legume moniliform ("*Cojoba*", in part).
 b. Floral bracts minute, not exerted nor readily visible in young head; costa and rachis glabrous or becoming glabrous in age; rachial glands mostly longitudinal..... 1. *P. MEMBRANACEUM*
- bb. Floral bracts 2-6 mm. long, exerted beyond or visible among buds of young head; costa and rachis pubescent except subglabrous in *P. rufescens* var. *vallense*; rachial glands essentially isodiametric.
 c. Leaflets 1-5 pairs, only slightly asymmetrical, 2-15 cm. long (if small usually subglabrous on costa).
 d. Terminal pair of leaflets usually 10 cm. long or longer; costa of leaflet markedly pubescent below; floral bracts about 4 mm. long, exerted, the young head appearing burr-like..... 2. *P. RUFESCENS*
 dd. Terminal pair of leaflets seldom as much as 7 cm. long; costa of leaflet subglabrous below; floral bracts less than 3 mm. long, comparatively inconspicuous in young head..... 2a. *P. RUFESCENS* var. *VALLENSE*
- cc. Leaflets 4-8 pairs, markedly oblique or inequilateral basally, 2-6 cm. long, tomentose on the costa..... 3. *P. TUBULIFERUM*
- aa. Leaves bipinnate; legume various, seldom moniliform.
 b. Pinnae only 1 pair.
 c. Leaflets 3-12 per pinna; stems unarmed.
 d. Leaflets in pairs (even-pinnate); peduncle conspicuous, 2-24 cm. long; corolla elongate, 12-16 mm. long; legume moniliform.
 e. Leaflets 2-5 (usually 3) pairs per pinna; peduncle usually 2-3 but never more than 6 or 7 cm. long; corolla about 12 mm. long..... 4. *P. VALERIOI*
 ee. Leaflets 4-6 pairs per pinna; peduncle 8-24 cm. long; corolla about 16 mm. long..... 5. *P. CATENATUM*
- dd. Leaflets usually 3 or 5 (odd-pinnate) per pinna; heads or spikes scarcely pedunculate; corolla mostly 6-7 mm. long; legume flattened, of essentially uniform width ("*Zygia*").
 e. Leaflets 3 or 5 per pinna, broadly elliptic (normally less than 3 times as long as broad); flowers in nearly sessile, very condensed spikes or heads..... 6. *P. LATIFOLIUM*
 ee. Leaflets 3 per pinna, narrowly elliptic (3 or more times as long as broad); flowers in short, lax spikes..... 7. *P. LONGIFOLIUM*
- cc. Pinnae bifoliolate; stems normally armed with stipular spines.
 d. Flowers in pronounced spikes, the floriferous portion mostly 3-12 cm. long; corolla 4-11 mm. long; legume arcuate or twisting.
 e. Corolla 7-11 mm. long, stamens 4-6 cm. long..... 8. *P. HYMENAEAFOLIUM*
 ee. Corolla 4-6 mm. long, stamens no more than 2.5 cm. long..... 9. *P. LANCEOLATUM*
- dd. Flowers capitate or short-spicate, the floriferous portion never more than 2 cm. long; corolla 2-4 mm. long; legume coiled or subcircinate.
 e. Flowers in short spikes; inflorescence an expanded, branched panicle, the peduncles mostly 1-3 cm. long..... 10. *P. OBLONGUM*
 ee. Flowers capitate; inflorescence a contracted panicle, the heads subsessile or on short peduncles less than 2 cm. long..... 11. *P. DULCE*
- bb. Pinnae 2 to several pairs.
 c. Petiole bearing 1-3 sessile glands well below insertion of and not associated with the lowest pair of pinnae (or their scars); leaflets less than 10 mm. long.
 d. Commonly armed at some or most nodes with stipular spines; buds large, ovoid, with prominent bud scales; legume arcuate, the valves not coiling after dehiscence: ("*Chloroleucon*")..... 12. *P. MANGENSE*
 dd. Unarmed; buds slender, naked; legume circinate, twisting in dehiscence, or unknown.
 e. Leaflets about 40 pairs per pinna, glabrous, narrower (up to 2 mm. wide)..... 13. *P. PSEUDO-TAMARINDUS*
 ee. Leaflets up to 16 pairs per pinna, pubescent below, broader (3-6 mm. wide)..... 14. *P. BARBOURIANUM*
- cc. Petiole glandular at extreme apex only (if apparently glandular lower down, gland bordered by scars of aborted pinnae); leaflets 10 mm. long or longer.

- d. Leaflets 10–25 mm. long; flowers sessile; legume moniliform-subterete, the valves twisting after dehiscence ("Cojoba"), or unknown.
- e. Leaflets pubescent below, obtuse or rounded apically; flowers short (about 4 mm. long), hirsutulous..... 14. *P. BARBOURIANUM*
- ee. Leaflets essentially glabrous, more or less acute apically; flowers elongate (about 1 cm. long), glabrous or nearly so..... 15. *P. COSTARICENSE*
- dd. Leaflets 20–50 mm. long; flowers pedicellate; legume thickish but flat, uniform, the valves never twisting ("Samanes").
- e. Cupular gland between insertions of basal pinnae large, as much as 1 cm. long; leaflets and flowers lightly pubescent..... 16. *P. MACRADENIUM*
- ee. Gland at insertion of basal pinnae small or nearly obsolete; leaflets and flowers densely pubescent..... 17. *P. SAMAN*

1. *PITHECOLOBIUM membranaceum* (Benth.) Schery, comb. nov.

Inga membranacea Benth. in Trans. Linn. Soc. 30:606. 1875.

Cojoba glabra Britt. & Rose, in N. Am. Fl. 23:33. 1928.

Pithecolobium glabrum Standl. in Trop. Woods 34:40. 1933.

Pithecolobium Davidsoniae Standl. in Field Mus. Publ. Bot. 22:82. 1940.



Fig. 85. *Pithecolobium membranaceum*

Small or moderate tree, the branchlets rufous-tomentellous when very young, soon glabrate, lenticellate. Leaves moderate, once-pinnate, the leaflets 2–4 pairs; petiole 1–3 cm. long, puberulent becoming glabrate, terete, bearing a sessile, concave, longitudinally extended gland shortly below insertion of basal pair of leaflets; rachis similar, 2–7 cm. long, bearing similar glands just below insertion of each pair of leaflets; leaflets elliptic, 3–11 (mostly 6–7) cm. long and usually about 3 cm. wide, briefly contracted apically into a bluntly acute tip, cuneate or sub-cuneate basally, glabrous above and below, finely and noticeably reticulate below;

stipules caducous or lacking in specimens examined. Inflorescence an axillary, pedunculate head; peduncle about 3 cm. long, puberulent, bearing a small bract (often caducous) on the upper half; head dense, subumbellate, the subtending bracts minute, rufous. Flowers sessile, greenish-white or pale greenish-yellow; calyx campanulate or campanulate-subtubular, 1-2 mm. long, glabrous except rufous-tomentose on the teeth; corolla tubular-funnelform, about 6 mm. long, glabrous except minutely puberulent on the teeth; stamens about 1 cm. long, the staminal tube included; ovary glabrous, sessile. Legume 2-10 cm. long, terete and moniliform, stipitate, red?, the valves twisting after dehiscence.

Costa Rica and western Panama.

CHIRIQUÍ: Boquete, Seemann 1192; Callejón Seco, Woodson & Schery 490; Davidson 770; Casita Alta, Woodson, Allen & Seibert 864; Camiseta, M. E. (Davidson) Terry 1352; R. Chiriquí Viejo, G. White 61; P. White 335; Volcan de Chiriquí, Davidson 900; Quebrado Velo, Woodson & Schery 272.

The species somewhat resembles *P. rufescens*, and grades into it, but as a rule has a more delicate, membranous leaflet and lacks the elongate subtending floral bracts so conspicuous in the (immature) head of *P. rufescens*. It belongs to the "Cojoba" section of *Pithecolobium*, and is distinguished from all except 2 species of that genus (in Panama) by the once-pinnate leaves and the peculiar moniliform legume.

The type of this species (*Inga membranacea*, Seemann 1192) has not been examined, but judging from a photograph of it in the U. S. Nat. Herbarium there seems little doubt but that it belongs with the other once-pinnate *Pithecolobium*s which Pittier transferred from *Inga*, and that the newer *Pithecolobium* species listed above can be referred to it. The species has rested as *Inga* since original publication without a second collection having been recognized.

2. *PITHECOLOBIUM RUFESCENS* (Benth.) Pittier, in Contr. U. S. Nat. Herb. 18:181. 1916.

Inga rufescens Benth. in Hook. Lond. Jour. Bot. 4:585. 1845.

Inga globulifera Benth. loc. cit. 1845, fide Pittier.

Inga Billbergiana Benth. loc. cit. 1845, fide Pittier.

Feuilléea rufescens Ktze. Rev. Gen. Pl. 1:189. 1891.

Cojoba rufescens Britt. & Rose, in N. Am. Fl. 23:32. 1928.

Tree, up to several meters tall, the branchlets ferruginous-tomentulose and usually prominently lenticellate. Leaves moderate or moderately large, once-pinnate, the leaflets 1-5 (mostly 3-4) pairs; petiole short, normally 1 cm. or less long, pubescent; rachis up to 10 cm. long, pubescent, subsulcate above, bearing a sessile, concave gland at insertion of leaflet pairs; leaflets mostly oblong, 4-15 cm. long and 2-6 cm. wide, rounded to bluntly acute-acuminate apically, subcuneate to rounded basally, very slightly inequilateral, usually glabrous above, lightly pubescent below except the costa rather heavily so, the lateral veins prominent and elevated below; stipules linear, early caducous. Inflorescence of solitary or geminate pedunculate heads from subterminal axils; peduncle 1-5 (usually about 2) cm.

Fig. 86. *Pithecolobium rufescens*

long, rufous-pubescent, generally bearing a solitary bract above the middle; head condensed; floral bracts linear, about 4 mm. long, ciliate, giving the head prior to anthesis a burr-like appearance. Flowers sessile, white; calyx short-tubular, about 2 mm. long, rufous-pubescent apically; corolla tubular-funnelform, 6 or 7 mm. long, rufous-pubescent on the lobes; stamens about 15 mm. long, the staminal tube included; ovary sessile, puberulent apically. Legume linear-moniliform, up to 15 cm. long, reddish with black seeds, puberulent, the valves very twisted after dehiscence.

Panama and Colombia.

CANAL ZONE: Ancón, Pittier 2747; Barro Colorado Island, Woodworth & Vestal 677; Kenoyer 369; Miraflores, Allen 1749, 1759; G. White 152; Pueblo Nuevo, P. White 303; R. Indio Hydrographic Station, Steyermark 17419. COCLÉ: Santa Clara, Muenscher 16241, 16293. COLÓN: Porto Bello, Pittier 2490. PANAMÁ: Chepo, Dodge, Hunter, Steyermark & Allen 16626; Pittier 4493; San José Island, Erlanson 39, 368; Taboga Island, Standley 27943.

This species exhibits considerable variability, and observation of material at hand supports belief that Pittier was entirely correct in reducing to synonymy Bentham's *I. globulifera* and *I. Billbergiana*. Likewise, Pittier's transfer of this and related species from *Inga* to *Pithecolobium* seems justified for the reasons he gives, although from the standpoint of practical identification the species could be more easily located in *Inga*, by means of the once-pinnate leaf criterion established by Bentham. As now recognized by most authors these few species of *Pithecolobium* ("*Cojoba*" of Britt. & Rose) are the only species of the MIMOSOIDEAE aside from *Inga* with once-pinnate leaves. Unfortunately rejection from *Inga* and inclusion in the "catch-all" *Pithecolobium* involves chiefly legume characters (moniliform fruit not found in *Inga*) not to be had in the majority of specimens. The legume resembles that of most species of *Pithecolobium* little more than the legume in *Inga*, and on this basis there may be some justification for Britton and Rose's genus *Cojoba*.

2a. *PITHECOLOBIUM RUFESCENS* (Benth.) Pittier var. **vallense** Schery, var. nov.

Arbor ramulis inconspicue lenticellatis, foliolis specie minoribus subglabris; bracteis capitulorum speciei similibus sed minoribus.

Tree of medium height, the branchlets rufous-tomentulose when very young, glabrate in age, inconspicuously lenticellate. Leaves small, once-pinnate, the leaflets 3-5 pairs; petioles very short, usually less than 5 mm. long, terete, puberulent; rachis up to 5 cm. long, like the petiole, bearing a sessile, concave gland just below insertion of the pairs of leaflets; leaflets oblong to narrowly elliptic, usually not longer than 6 cm., nearly glabrous, mostly obtuse apically and basally. Inflorescence an axillary, pedunculate head; floral bracts similar to those of the species but somewhat smaller and perhaps intermediate to condition found in *P. membranaceum*. Flowers white, sessile; calyx campanulate, little over 1 mm. long, pubescent apically; corolla tubular-funnelform, about 6 mm. long, pubescent on the lobes. Legume moniliform, red, the seeds black.

Apparently found only in vicinity of El Valle de Antón, Coclé, Panama.

COCLÉ: El Valle, Allen 770 (Herb. Missouri Bot. Gard., TYPE), 1834 (COTYPE), 2495; Hunter & Allen 355.

This entity has been described as a variety rather than as a species in that degrees of intermediacy (Hunter & Allen 355 especially) occur towards *P. rufescens*. Its geographic distribution, as far as known, fits nicely the concept of a localized variety.

3. *PITHECOLOBIUM TUBULIFERUM* Pittier, in Contr. U. S. Nat. Herb. 18:181. 1916.

Inga tubulifera Benth. in Hook. Lond. Jour. Bot. 4:584. 1845.

Cojoba tubulifera Britt. & Rose, in N. Am. Fl. 23:32. 1928.

Shrub or small tree, the young branchlets brownish tomentose, becoming subglabrous in age and inconspicuously lenticellate. Leaves moderately small, once-

pinnate, the leaflets 4-8 pairs; petiole usually less than 1 cm. long, terete, tomentose like the young branchlets, often appearing to bear a gland because of abortion of lowermost pair of leaflets; rachis up to 10 cm. long, similar to the petiole, bearing sessile, concave glands at insertion of leaflet pairs; leaflets somewhat variable but mostly oblong, 2-6 cm. long and 1-2.5 cm. wide, bluntly acute to rounded or subtruncate-retuse (malformation?) apically, obliquely rounded basally, subglabrous above, lightly pubescent below except heavily so on the costa; stipules linear, caducous. Inflorescence an axillary, pedunculate head; peduncle 3-(?) cm. long, tomentose, bearing a linear-lanceolate bract (this often caducous) above the middle; head condensed; floral bracts linear, about 2 mm. long, pubescent and ciliate. Flowers sessile, whitish; calyx campanulate-funnelform, about 1 mm. long, rufous-pubescent except at extreme base; corolla tubular or nearly so, about 7 mm. long, glabrous except on the lobes; ovary sessile, glabrous. Legume not known, but presumably similar to that of *P. rufescens*.

Panama and Colombia.

CHIRIQUÍ: Boquete, Davidson 628. COCLÉ: Penonomé, Williams 49.

The description is chiefly from the Chiriquí specimen (in immature flower). As far as can be determined from keys and rather incomplete descriptions, this specimen is *P. tubuliferum*, although no authentic specimens are available for comparison. It is similar to *P. rufescens* but differs in having more and generally smaller leaflets, and has the floral bracts less pronounced.

4. *PITHECOLOBIUM VALERIOI* (Britt. & Rose) Standl. in Field Mus. Publ. Bot. 18:509. 1937.

Cajoba Valerioi Britt. & Rose, in N. Am. Fl. 23:32. 1928.

Cajoba Standleyi Britt. & Rose, loc. cit. 1928.

Pithecolobium Standleyi Standl. loc. cit. 1937.

Shrub or small tree, the branchlets rufous-puberulent when young becoming glabrate, lenticellate. Leaves large, bipinnate, the pinnae 1 pair, the leaflets 2-5 (usually 3) pairs per pinna; petiole quite short, less than 1 cm. long, terete, puberulent, bearing an apicule about 4 mm. long terminally between insertion of the pinnae; pinnular rachis almost 10 cm. long, rufous-tomentulose, terete, bearing sessile, subcupular glands at insertion of leaflet pairs; leaflets ovate to elliptic, the terminal pair as much as 15 cm. long and 6 cm. wide, acute to short-acuminate apically, very obliquely blunt or rounded basally (the basal pair as small as 2.5 cm. long and 1 cm. wide, scarcely oblique basally, not strictly opposite), subglabrous above and below except on the costa, the veins prominent below; stipules linear, scarcely 2 mm. long. Inflorescence a pedunculate head arising slightly above the axil; peduncle 2-(6?) cm. long, puberulent, bearing a squamiform bract above the middle; head condensed, about 4 cm. in diameter; floral bracts linear-lanceolate, 2-3 mm. long, rufous-pubescent and ciliate. Flowers sessile, white; calyx cylindric, 2-3 mm. long, glabrous except tomentulose on the teeth; corolla tubular, about 12 mm. long, glabrous except tomentulose on the lobes; stamens about 18 mm.



Fig. 87. *Pithecolobium catenatum*

long, the staminal-tube included; ovary sessile, subglabrous. Legume apparently moniliform, about 10 cm. long, red, the seeds black, the valves twisting after dehiscence.

Costa Rica and Panama.

BOCAS DEL TORO: Chiriquí Lagoon, H. von Wedel 2246, 2254; Water Valley, H. von Wedel 1723.

The Water Valley specimen is rather poor, and had originally been determined as *Inga*. The species is poorly known, but seemingly is quite variable. The cited specimens are probably better regarded as conspecific with *P. Valerioi* and *P. Standleyi* than as distinct and coordinate with these species, although certain differences exist between collections of *P. Valerioi*, *P. Standleyi* and the cited specimens.

5. *PITHECOLOBIUM CATENATUM* Donn. Smith, in Bot. Gaz. 48:294. 1909.

Cajoba catenata Britt. & Rose, in N. Am. Fl. 23:32. 1928.

Tree, the branchlets ferruginous-tomentulose when young, longitudinally striate or rugose when dry, prominently lenticellate. Leaves large, twice-pinnate, the pinnae 1 pair, the leaflets 4-6 pairs per pinna; petiole 2-6 cm. long, terete, ferruginous-pubescent, subsulcate above, usually bearing a small, sessile gland apically; pinnular rachis 10-20 cm. long, similar to the petiole, bearing a small, crateriform gland at insertion of the pairs of leaflets; leaflets elliptic or obovate, the terminal pair quite large, 10-20 cm. long and 5-7.5 cm. wide, the basal pair 3-8 cm. long and 1.5-4.5 cm. wide, acute apically, inequilaterally acute or obtuse basally, subglabrous above except on the costa, lightly pubescent below or subglabrous except on the veins; stipules caducous. Inflorescence of very long pedunculate heads lateral from the axils of the older wood; peduncle 8-24 cm. long, usually with a squamiform bract above the middle, tomentulose; head condensed, about 4 cm. in diameter. Flowers sessile, white; calyx tubular, 2.5-4.5 mm. long, glabrous except puberulent on the teeth; corolla tubular, about 16 mm. long and 1.0-1.5 mm. wide, glabrous, longitudinally substriate, the lobes thick and brown-pubescent apically; stamens about 25 mm. long, the staminal tube included; ovary terete, lightly pubescent, 12- to 14-ovulate; style glabrous. Legume moniliform, terete, up to 18 cm. long, red, tomentose, short-stipitate, the valves twisting after dehiscence.

Costa Rica and Panama.

BOCAS DEL TORO: Bastimentos, *H. von Wedel* 2909; Careening Cay, *H. von Wedel* 2815; Isla Colón, *H. von Wedel* 576; Old Bank Island, *H. von Wedel* 1977, 2066; without locality, *H. von Wedel* 199.

This species is especially marked by the unusually long peduncles.

6. *PITHECOLOBIUM LATIFOLIUM* (L.) Benth. in Hook. Lond. Jour. Bot. 3:214. 1844.

Mimosa latifolia L. Syst. ed. 10, 1310. 1759.

Zygia arborens St. Hil. Expos. Fam. Nat. 2:246. 1805, fide Britt. & Rose.

Inga latifolia Willd. Sp. Pl. 4:1020. 1806.

Calliandra latifolia Griseb. Fl. Brit. W. Ind. 225. 1860.

Feuillécia latifolia Ktze. Rev. Gen. Pl. 1:188. 1891.

Zygia latifolia Fawc. & Rendle, Fl. Jam. 4²:150. 1920.

Pithecolobium cbagrense Pittier, in Contr. U. S. Nat. Herb. 20:465. 1922.

Shrub or small tree, the branchlets glabrous, inconspicuously lenticellate. Leaves moderately large, bipinnate, the pinnae one pair, the leaflets 3-5 per pinna;

petiole very short, mostly 2-3 mm. long, callous, rugose, bearing a patelliform or subpeltate gland apically; rachis of pinna up to 10 cm. long, sulcate above, puberulent or subglabrous, bearing a small gland apically at insertion of terminal leaflets; leaflets elliptic, 5-15 cm. long and 1.5-6 cm. wide, the terminal pair opposite on the pinna, the penultimate pair alternate or lacking, the basal leaflet solitary on the outer side (sometimes basal leaf caducous), acute and short-acuminate apically, cuneate or subcuneate basally, slightly asymmetrical, glabrous above and below, with usually 3 prominent, ascending, arcuate lateral veins; stipules ovate. Inflorescence of fasciculate sessile heads (or very condensed spikes) lateral on the older branchlets, the axis scarcely 5 mm. long, pubescent; bracts ovate, about 1 mm. long. Flowers sessile, pinkish; calyx cupular, about 1 mm. long, pubescent apically on the minute teeth; corolla tubular, about 7 mm. long, only slightly expanded above, subglabrous except puberulent on the lobes, striate; stamens usually about 17 mm. long, the staminal tube slightly exerted; ovary subsessile, lightly pubescent; style exceeding the stamens, the stigma capitate. Legume linear, about 12 cm. long and 2 cm. wide (immature?), flat, minutely puberulent, arcuate.

West Indies; Honduras to Panama; Colombia to Brazil and Bolivia.

BOCAS DEL TORO: Garay Creek, *H. von Wedel* 2633; Old Bank Island, *H. von Wedel* 2014; Water Valley, *H. von Wedel* 868. CANAL ZONE: "Chagres," *Fendler* 90; France Field, *Standley* 30368; Gatún, *Hayes* 459; *Pittier* 2808.

As with *P. longifolium*, *P. latifolium* appears to be a fairly constant species. It is quite similar to *P. glomeratum* and *P. cauliflorum*, two South American species doubtfully distinct from each other. *P. latifolium* is distinguished from *P. longifolium* in having a much shorter inflorescence, wider and often more numerous (5 vs. 3) leaflets.

7. *PITHECOLOBIUM LONGIFOLIUM* (H. & B.) Standl. in Field. Mus. Publ. Bot. 4:212. 1929.

Inga longifolia Humb. & Bonpl. ex Willd. Sp. Pl. 4:1010. 1806.

Mimosa ligustrina Vahl, Eclog. 3:34, t. 27. 1807, not Jacq. 1801, fide Benth

Inga Vablium DC. Prodr. 2:438. 1825.

Inga falciformis DC. loc. cit. 1825, fide Benth.

Pithecolobium ligustrinum Benth. in Hook. Lond. Jour. Bot. 3:213. 1844.

Pithecolobium glomeratum var. *spicatum* Seem. Bot. Voy. Herald, 116. 1852-53, fide Britt. & Rose.

Pithecolobium Vablium Benth. in Trans. Linn. Soc. 30:594. 1875.

Fenillea longifolia Ktze. Rev. Gen. Pl. 1:185. 1891.

Zygia longifolia Britt. & Rose, in N. Am. Fl. 23:40. 1928.

Moderate-sized tree, the branchlets glabrous or nearly so, lenticellate but not prominently so. Leaves moderate, bipinnate, the pinnae 1 pair, the leaflets 3 to the pinna (terminal pair and outer member of reduced basal pair?); petiole short and condensed, 3-10 mm. long, rugose, callous basally, bearing between insertion of the pinnae a sessile patelliform or subpeltate gland; rachis of pinna usually about 2 cm. long, sulcate and puberulent above, commonly but not always bearing a gland between insertion of terminal pair of leaflets; leaflets narrowly ovate-lanceo-

Fig. 88. *Pithecolobium longifolium*

late, lanceolate or elliptic, 4–12 cm. long and 1.5–3.5 cm. wide, cuneate or subcuneate basally, usually bluntly acute or acuminate apically, glabrous on both sides, inconspicuously reticulate; stipules lanceolate, about 2 mm. long. Inflorescence lateral on older wood, of short, lax, fasciculate spikes; spikes about 2 cm. long, scarcely pedunculate, subglabrous; bracts lanceolate, about 1 mm. long, subpersistent. Flowers small, sessile, whitish or pinkish, fragrant; calyx cupular, about 1 mm. long, glabrous except the minute teeth puberulent or ciliate; corolla tubular-funnelform, 6–7 mm. long, glabrous; stamens many, about 16 mm. long, the staminal tube well exserted; ovary pubescent. Legume linear-arcuate, up to 30 cm. long and about 13 mm. wide, glabrous, flat and thin, short-stipitate, the seeds longitudinal.

Honduras to Panama; northern South America.

BOCAS DEL TORO: Water Valley, *H. von Wedel* 653; *Cooper & Slater* 54b. CANAL ZONE: R. Chagres, *Steiermark & Allen* 16787; R. Indio Hydrographic Station, *Steiermark* 17418; Tumba Vieja, *Steiermark & Allen* 16745. COCLÉ: Bismarck, *Williams* 245; El Valle, *Allen* 108, 2765. COLÓN: Santa Isabel, *Pittier* 462. DARIÉN: Boca de Cupé, *Allen* 871. PANAMÁ: R. Las Lajas, *Allen* 1613; R. La Maestra, *Allen* 23.

The species in Panama seems to exhibit stability unexpected in the genus. Similar to *P. latifolium* and other species, the differences, although minor, appear surprisingly constant.



Fig. 89. *Pithecolobium hymenaeifolium*

8. *PITHECOLOBIUM HYMENAEFOLIUM* (H. & B.) Benth. in Hook. Lond. Jour. Bot. 3:198. 1844.

Inga hymenaeifolia Humb. & Bonpl. ex Willd. Sp. Pl. 4:1008. 1806.

Mimosa hymenaeifolia Poir. in Lam. Encycl. Meth. Suppl. 1:38. 1810.

Pithecolobium panamense Walp. & Duchass. in Linnaea 23:746. 1850.

Shrub or small tree to a few meters tall; branchlets subglabrous, minutely lenticellate, with a few longitudinal lines or thin ridges and usually paired nodal thorns. Leaves moderate, bipinnate, the pinna bifoliolate; petiole mostly 2-4 cm. long, canaliculate above, glabrous, bearing apically a sessile, cupular gland; axis of the pinna up to 2 cm. long, like the petiole; mature leaflets asymmetrically ovate

or ovate-lanceolate, 6–13 cm. long and 2–5 cm. wide, bluntly acute apically, obliquely rounded basally, glabrous above and below except often barbate basally below on the narrow side; stipules modified as small to prominent recurved thorns or spines to either side of the petiolar insertion. Inflorescence of elongate, axillary, subterminal and terminal pedunculate spikes; peduncle 1.5–6 cm. long, subglabrous; floriferous portion of the spike mostly 3–6 cm. long, the axis tomentulose and few-sulcate, the flowers condensed; bractlets minute, ovate-subulate. Flowers large, sessile, whitish; calyx cupular, about 2 mm. long, tomentulose, the teeth short and somewhat irregular; corolla funnelform, usually about 1 cm. long, tomentulose without, valvate; stamens 5–6 cm. long, united basally into a prominently exerted staminal tube 2–4 cm. long; ovary sessile, pubescent; style (plus ovary) about 6 cm. long, the stigma capitellate. Legume 7–10 cm. long and about 15 mm. wide, falcate, compressed, tomentose, rugose, few-seeded, the seeds black. Panama, Colombia, Venezuela.

CANAL ZONE: "north end of island" (Miraflores?), *P. White 124*; R. Chagres, *Steyermark & Allen 16790*; Salamanca Hydrographic Station, *Woodson, Allen & Seibert 1567*. PANAMÁ: Taboga Island, *Woodson, Allen & Seibert 1539*; Chepo, *Dodge, Hunter, Steyermark & Allen 16663*.

The corolla of the cited specimens is slightly shorter than dimensions given for the species by most authors. There is some uncertainty as to application of the Willdenow name and its interpretation by later authors.

9. *PITHECOLOBIUM LANCEOLATUM* (H. & B.) Benth. in Hook. Lond. Jour. Bot. 5:105. 1846.

Mimosa ligustrina Jacq. Fragm. Bot. 29, pl. 32, f. 5. 1801.

Inga lanceolata Humb. & Bonpl. ex Willd. Sp. Pl. 4:1005. 1806.

Mimosa lanceolata Poir. in Lam. Encycl. Meth. Suppl. 1:37. 1810.

Pithecolobium macrostachyum Benth. in Hook. Lond. Jour. Bot. 3:198. 1844, excl. syn. Vahl., fide Benth.

Pithecolobium ligustrinum Kltz. ex Benth. in Trans. Linn. Soc. 30:571. 1875, not Benth. 1844.

Pithecolobium macrosiphon Standl. in Contr. U. S. Nat. Herb. 20:191. 1919, fide Standl. & Steyermark.

Pithecolobium Winzerlingii Britt. & Rose, in N. Am. Fl. 23:193. 1928, fide Standl. & Steyermark.

This species, to the best of my knowledge, has not yet been collected in Panama, but is known from Mexico, northern Central America and Costa Rica, and northern South America. It thus can be expected in Panama also. It is a small, armed tree similar vegetatively to *P. oblongum* except that the leaflets average larger. The floriferous portion of the spike is considerably more elongate (4–12 cm. long) than in *P. oblongum*, and the corolla is 5–6 mm. long. The ovary is sessile, the legume similar to *P. oblongum* although perhaps somewhat larger. As with *P. dulce*, the aril of the seeds is said to be edible and used for making a beverage suggestive of lemonade. *P. lanceolatum* can scarcely be distinguished from *P. pachypus* Pittier except in fruit. *P. pachypus*, a species of Salvador,

Guatemala, and Mexico, has a significantly broader, stockier fruit than does *P. lanceolatum*, but insufficient fruiting material is on hand to appraise accurately the delimitation and distribution of these species.

10. *PITHECOLOBIUM OBLONGUM* Benth. in Hook. Lond. Jour. Bot. 3:198. 1844.

Feuilléea oblonga Ktze. Rev. Gen. Pl. 1:188. 1891.

Pithecolobium paniculatum Pittier, in Contr. U. S. Nat. Herb. 20:462. 1922.

Pithecolobium pulchellum Pittier, loc. cit. 1922.

Pithecolobium microstachyum Standl. in Jour. Wash. Acad. 13:439. 1923.

Pithecolobium Pittieri Britt. & Killip, in Ann. N. Y. Acad. Sci. 35:125. 1936.



Fig. 90. *Pithecolobium oblongum*

Small or bushy tree to several meters; branchlets essentially glabrous, with a few longitudinal lines or thin ridges and many prominent lenticels. Leaves moderately small, bipinnate, each pinna bifoliolate; petioles mostly 1–3 cm. long, slender, subglabrous, somewhat flattened, canaliculate above, bearing a short-columnar, concave gland apically above; axis of the pinna mostly 1 cm. or less long, similar to the petiole except the apical gland sometimes obsolete; leaflets asymmetrically ovate, oblong or obovate, up to almost 6 cm. long and 3.5 cm. wide, obtuse to rounded or subtruncate apically, obliquely obtuse basally, glabrous above and below except barbate basally on the narrow side below; stipules modified as small or moderate thorns or spines to either side of the petiole, a few mm. to 1 cm. long or longer. Inflorescence an axillary panicle, usually subterminal, consisting of a

number of pedunculate spikes; peduncles slender, usually 1–2 cm. long at maturity, lightly pubescent or subglabrous; floriferous portion of spike 5–20 mm. long, condensed apically and somewhat more lax baseward; bractlets ovate-lanceolate, scarcely 1 mm. long, persistent, pilosulous. Flowers small, sessile, whitish; calyx cupular, little over 1 mm. long, shallowly lobed, puberulent, 5-angled; corolla funnelform, 3–4 mm. long, valvate, puberulent at least apically; stamens about 8–9 mm. long, united below into a short staminal tube; ovary stipitate, glabrous, the stipe almost 1 mm. long. Legume linear-circinate, up to 10 cm. long and about 1 cm. wide, frequently coiled upon itself, dehiscent, compressed but turgid at and indented between the seeds, nearly glabrous, reddish; seeds ovoid, lustrous-black.

Mexico to Panama.

CANAL ZONE: Farfan Beach, Hunter & Allen 446; without locality, Allen 1632; Hayes 313, 761; Seemann 403. PANAMÁ: beach, Panama Vieja, Allen 827; Bro. Paul 788; beach, San Carlos, Allen 1133; Bella Vista, Killip 12019; Punta Paitilla, Piper 5120.

No authentic specimens of *P. oblongum* have been available for comparison with the cited Panamanian material. Benthams description fits the cited specimens as far as it goes, but it is scarcely complete and comprehensive in a modern sense. Yet, it seems very likely that our specimens are *P. oblongum*, a species described from a Panamanian type, especially in that they key to or close to *P. oblongum* as interpreted by various authors. Specimens of *P. microstachyum* Standl. seem to differ from our material only within the allowable limits of specific variation. *P. pulchellum* Pittier and *P. Pitteri* Britt. & Killip differ from the Panamanian material inconstantly and in a very minor fashion. There is also apparent intergradation to *P. unguis-cati*, restricted (for convenience?) to the West Indies. The species is evidently a sea beach plant.

11. *PITHECOLOBIUM DULCE* (Roxb.) Benth. in Hook. Lond. Jour. Bot. 3:199. 1844.

Mimosa dulcis Roxb. Pl. Coromand. 1:67. 1795.

Inga dulcis Willd. Sp. Pl. 4:1005. 1806.

Inga pungens H. & B. ex Willd. loc. cit. 1004. 1806, fide Benth.

Mimosa pungens Poir. in Lam. Encycl. Meth. Suppl. 1:36. 1810.

Inga javana DC. Prodr. 2:436. 1825, fide Benth.

Mimosa unguis-cati Blanco, Fl. Filip. 731. 1837, non L., fide Benth.

Acacia obliquifolia Mart. & Gal. in Bull. Acad. Brux. 10²:317. 1843, fide Benth.

Inga leucantha Presl, Bot. Bem. 65. 1844, fide Benth.

Feuilléea dulcis Ktze. Rev. Gen. Pl. 1:184. 1891.

Pithecolobium littorale Britt. & Rose ex Record, in Trop. Woods 11:15. 1927, fide Standl. & Steyerl.

Small to medium tree, often flowering when small and shrub-like, the branchlets puberulent or subglabrous becoming glabrous in age. Leaves small, bipinnate, each pinna bifoliolate; petiole mostly 1–2 cm. long, subglabrous or lightly puberulent, margined and sulcate above especially apically, callous basally, bearing a concave gland at insertion of the pinnae; axis of the pinna like the petiole, up to 1 cm. long, the gland frequently smaller than the petiolar gland; leaflets 2 per pinna, mostly inequilaterally oblong, 2–6 cm. long and 1–3 cm. wide, obliquely obtuse or

rounded basally, blunt or rounded apically, glabrous except barbate basally below; stipules modified as scarcely noticeable to moderate spines or thorns on either side of the petiole. Inflorescence a terminal or subterminal panicle of pedunculate heads; peduncles about 1 cm. long or longer at anthesis, puberulent; head globose, about 15 mm. in diameter, several-flowered, compact; bracts scarcely 1 mm. long. Flowers small, whitish; calyx cupular, about 1 mm. long, canescent-tomentulose; corolla funnellform, 2-3 mm. long, tomentulose, the lobes about 1 mm. long; stamens many, about 8 mm. long, united below into a staminal tube for about half their length, glabrous; ovary pubescent, stipitate. Legume torulose or subtorulose, up to 12 cm. long and 8-15 mm. wide, coiled, glabrous or puberulent, dehiscent, the valves twisting after dehiscence.

Mexico to northern South America.

CANAL ZONE: Balboa, Standley 30842.

This species is very similar to *P. unguis-cati*, a species "not known to occur in Panama," from which it differs in having pubescent rather than glabrous flowers.

12. *PITHECOLOBIUM MANGENSE* (Jacq.) Macbr. in Contr. Gray Herb. 59:3. 1919.

Mimosa mangensis Jacq. Enum. Pl. Carib. 34. 1760.

Mimosa parvifolia Sw. Fl. Ind. Occ. 984. 1800.

Acacia parvifolia Willd. Sp. Pl. 4:1086. 1806.

Mimosa antillarum Lam. ex Poir. in Lam. Encycl. Meth. Suppl. 1:80. 1810.

Acacia micrantha Desv. ex Ham. Prodr. Fl. Ind. Occ. 60. 1825, fide Benth.

Inga maritima Spreng. ex DC. Prodr. 2:441. 1825, fide Benth.

Pithecolobium parvifolium Benth. in Hook. Lond. Jour. Bot. 3:223. 1844.

Feuilléea mangensis Ktze. Rev. Gen. Pl. 1:186. 1891.

Enterolobium mangense Fawc. & Rendle, Fl. Jam. 4²:151. 1920.

Chloroleucon mangense Britt. & Rose, in N. Am. Fl. 23:38. 1928.

Catbormium mangensis Dugand, in Apunt. Hist. Nat. Dept. Atl. 32. 1933, fide Britt. & Killip.

Shrub or small tree, armed at most (older) nodes with paired spines, the branchlets glabrate and moderately lenticellate, frequently flexuous in active growth, bearing large, ovoid, axillary buds with prominent bud-scales. Leaves small, twice-pinnate, the pinnae 4-10 pairs, the leaflets 8-30 pairs; petiole slender, usually 1-2 cm. long, more or less puberulous, flattened on the upper side and bearing a small clavate gland, usually below the middle; primary rachis similar, sulcate above, usually bearing a sessile, concave gland between some or at least the terminal pair of pinnae; rachis of pinna mostly 2-4 cm. long, pubescent, more or less terete; leaflets small, linear, usually about 6 mm. long and little over 1 mm. wide, somewhat falcate, asymmetrically acute apically, obliquely rounded or truncate basally, lightly pubescent or subglabrous, the veins few and prominent below; stipules at most nodes becoming modified as spines, those straight or slightly curved, as much as 15 mm. long. Inflorescence an axillary, pedunculate head; peduncle slender, about 2 cm. long, somewhat puberulent; bracts linear, minute, caducous. Flowers white, sessile; calyx cupuliform-campanulate, about 2 mm. long, glabrous except

perhaps on the lobes; corolla tubular-funnelform, 4–8 mm. long, glabrous except the lobes puberulent-tipped; stamens 12 or more mm. long, the staminal tube about equalling the corolla. Legume linear, 6–14 cm. long and 10–12 mm. wide, compressed or nearly flat but thick, fleshy-coriaceous, glabrous, reticulate-veined, curved or nearly straight.

Panama and northern South America; Jamaica.

VERAGUAS: Santiago, Allen 1082.

This species is poorly represented in the herbarium, its variability and exact taxonomic position uncertain.

13. *PITHECOLOBIUM PSEUDO-TAMARINDUS* (Britt.) Standl. in Field Mus. Publ. Bot. 4:212. 1929.

Jupunba pseudo-Tamarindus Britt., in N. Am. Fl. 23:193. 1928.

Unarmed, buttressed tree up to 18 m. tall, the branchlets angulate and ferruginous-tomentulose. Leaves twice-pinnate, the pinnae mostly 12–16 pairs, each pinna with about 30–40 pairs of leaflets; petiole 1–4 cm. long, terete, bearing 1–3 sessile glands towards or above the middle; rachis up to 20 cm. long, tomentulose, bearing sessile glands between all pairs of pinnae; pinnae mostly opposite, 6–9 cm. long, the rachis tomentulose, gland-bearing between the upper leaflets; leaflets narrowly oblong, 5–7 mm. long and almost 2 mm. wide, apically obtuse or rounded, basally sessile and obliquely rounded, glabrous, lighter below, the costa central, the secondary nerves only moderately prominent. Inflorescence subumbellate, axillary, the peduncle 2–12 cm. long, ebracteate, the pedicels 4–6 mm. long. Flowers (type specimen in fruit) white, the center (terminal) one of the umbel somewhat larger (as in "*Samanea*"); calyx campanulate, about 2 mm. long, puberulent, the teeth 5, triangular, about 0.5 mm. long; corolla funnelform, about 7 mm. long, lightly pubescent without, the lobes 5, nearly as long as the tube; stamens many, about 25 mm. long, united only for the basal 3 mm., glabrous; anthers minute; ovary cylindric, about 3 mm. long, tomentulose, subtruncate apically, several- (about 14-) ovulate in 2 rows; style glabrous. Legume circinate, 10–12 mm. wide, lightly constricted and falsely septate between the 3–5 seeds, the valves thin, reddish-brown, sparsely strigillose or almost glabrous.

BOCAS DEL TORO: Bocas Island, Cooper 461 (fruit); Chiriquí Lagoon, H. von Wedel 1132 (flower).

The species is similar to some of the West Indian "*Jupunbas*" and "*Abaremas*." It had been known only from the type (Cooper 461; in fruit), but the von Wedel specimen (flowers only) appears to be the same species although the peduncle of the latter is markedly more elongate than in the type. The above description is pieced from both specimens.

14. *PITHECOLOBIUM BARBOURIANUM* Standl. in Contr. Arn. Arb. 5:74, pl. II. 1933.

Unarmed tree, the branchlets fulvous hirsute-tomentose, slender. Leaves

moderately large, twice-pinnate, the pinnae 8-11 pairs, the leaflets mostly 9-16 pairs per pinna; petiole 1-2 cm. long, somewhat thick, densely tawny hirsute, bearing a sessile, irregular, shallowly crateriform gland near the apex; primary rachis 5-12 cm. long, subterete, pubescent like the petiole, bearing similar solitary glands below insertion of each pair of pinnae; pinnular rachis 3-6 cm. long, pilose, glandular at most upper nodes; leaflets oblong or oblong-trapezoidal, 5-10 mm. long and 3-6 mm. wide, apically obtuse or rounded, basally oblique, glabrous (except sometimes on the depressed costa) above, lighter and pilose below, especially on the costa, the secondary veins prominent, the margins subrevolute and adpressed-ciliate. Inflorescence of axillary, pedunculate heads; peduncles usually geminate, slender, 4-6 cm. long, pilose; head about 1 cm. in diameter, multiflorate, very condensed; floral bracts obovate-spatulate, about 2 mm. long. Flowers sessile, apparently inconspicuously dimorphic (terminal flower of head usually grosser, its ovary evidently not functional, the staminal column enlarged); calyx funnelform, about 3 mm. long, golden-brown hirsutulous, briefly and obtusely 5- to 6-dentate; corolla apparently funnelform, about 4 mm. long (mature bud), densely golden-hirsute without; stamens about 13, the filaments briefly united below, glabrous, the anthers small, eglandular; ovary pilose, subsessile. Legume not known.

CANAL ZONE: Barro Colorado Island, *Shattuck 237*.

The species is known only from the type collection. Without fruit or mature flower its affinities are difficult to establish. It would seem, however, to fall near the well-represented *P. saman*.

15. *PITHECOLOBIUM COSTARICENSE* (Britt. & Rose) Standl. in *Trop. Woods* 34:40. 1933.

Cojoba costaricensis Britt. & Rose, in *N. Am. Fl.* 23:31. 1928.

Moderate-sized, spreading tree, the branchlets ferruginous-tomentose becoming more or less glabrate in age, lenticellate. Leaves moderately large, twice-pinnate, the pinnae 4-9 pairs, the leaflets mostly 10-14 pairs per pinna; petioles mostly 2-4 cm. long, terete, short-tomentose, eglandular or inconspicuously glandular, scarcely callous basally; primary rachis (petiolar extension) like the petiole, bearing small, erect, truncate or concave glands between insertion of pairs of pinnae; pinnular rachis similar, but the glands frequently obsolete between the leaflets; leaflets ovate-lanceolate, 10-25 mm. long and 5-10 mm. wide, bluntly acute apically, obliquely rounded or subtruncate basally, subglabrous except puberulent on the costa, dull and inconspicuously reticulate above, lighter and more obviously reticulate below. Inflorescence of solitary pedunculate heads from older axils, the peduncle 3-8 cm. long, tomentose, eglandular; head 3-4 cm. in diameter, the flowers crowded; bracts minute or caducous. Flowers white, sessile; calyx cupular-tubular, about 2 mm. long, subglabrous except rufous-tomentulose on the teeth; corolla tubular, approximately 1 cm. long, glabrous, the lobes scarcely expanded; stamens about 16 mm.



Fig. 91. *Pithecolobium costaricense*

long, glabrous, the staminal tube included; ovary subglabrous, very short-stipitate. Legume moniliform-subterete, reddish, the valves twisting after dehiscence.

Cost? Rica and Panama.

CHIRIQUÍ: R. Chiriquí Viejo, P. White 22.

The P. White 22 specimen is sterile, but seems on vegetative characters to be *P. costaricense*, a species to be expected in Panama. *P. chazutense* Standl., of Peru, and several Central American species are quite similar to *P. costaricense*.

16. *PITHECOLOBIUM MACRADENIUM* Pittier, in Contr. U. S. Nat. Herb. 20:465. 1922.

A moderate-sized tree, the branchlets more or less pubescent. Leaves moder-

ately large, twice-pinnate, the pinnae usually 3 pair, each bearing 5-8 pairs of leaflets; petioles 3.5-7 cm. long, minutely pubescent; primary rachis (petiolar extension) similar, bearing between insertion of the basal pair of pinnae a large, subcupular gland as much as 1 cm. long (possibly a disease condition), bearing between upper pairs of leaflets smaller glands or these more or less obsolete; rachis of pinna similar, bearing small glands between insertion of the pairs of leaflets; leaflets ovate or rhombic-ovate, 2-5 cm. long and 1-2.2 cm. broad, sessile, rounded apically, inequilateral basally, glabrous above except pubescent on the costa, paler and more or less pilosulous beneath; stipules linear, caducous. Inflorescence of axillary, pedunculate, condensed umbels or very short spikes; peduncles 5-6 cm. long, ferruginous-pubescent; flowers short-pedicellate, the pedicels 2.5 mm. long and sparsely puberulous. Flowers white, small; calyx campanulate, about 3.5 mm. long, puberulous, the teeth short, subacute; corolla funnelform, 6-6.5 mm. long, the tube glabrous, the lobes lanceolate, acute, and minutely brownish-pubescent; staminal tube included; pistil about 15 mm. long; ovary short-stipitate, glabrous. Legume about 10 cm. long and 2 cm. broad, thick, strongly arcuate, compressed, transversely sulcate between the seeds, short-stipitate.

Panama.

CANAL ZONE: Monte Lirio, *Christopherson 196*.

The species is known only from the type (U. S. Nat. Herb.). The above description is taken primarily from Pittier's original description. The most remarkable character of the species seems to be the very large gland between the basal pair of pinnae. I am familiar with no other species of the MIMOSOIDEAE bearing a gland of such proportions, and if this is a constant character not merely confined to an aberrant specimen, it may serve for ready identification of the species.

17. *PITHECOLOBIUM SAMAN* (Jacq.) Benth. in Hook. Lond. Jour. Bot. 3:216. 1844.

Mimosa Saman Jacq. Fragm. Bot. 15, pl. 9. 1800.

Inga cinerea H. & B. ex Willd. Sp. Pl. 4:1024. 1806, fide Benth.

Mimosa pubifera Poir. in Lam. Encycl. Meth. Suppl. 1:47. 1810.

Inga salutaris HBK. Nov. Gen. & Sp. 6:304. 1824, fide Benth.

Calliandra tubulosa Benth. in Hook. Lond. Jour. Bot. 3:101. 1844, fide Benth.

Pithecolobium cinereum Benth. loc. cit. 216. 1844.

?*Acacia propinqua* A. Rich. Ess. Fl. Cub. 466. 1845, fide Benth.

Calliandra Saman Griseb. Fl. Brit. W. Ind. 225. 1861.

Albizzia Saman F. Muell. Sel. Extra-Trop. Pl. 27. 1891, fide Rock, Legum. Pl. Hawaii.

Feuilléea Saman Ktze. Rev. Gen. Pl. 1:189. 1891.

Enterolobium Saman Prain ex King, in Jour. Asiat. Soc. Bengal 66²:252. 1897.

Samanea Saman Merrill, in Jour. Wash. Acad. 6:46. 1916.

A large, spreading, unarmed tree, the branchlets aureo-pubescent becoming glabrate, sparingly lenticellate. Leaves large, twice-compound, the pinnae 2-6 pairs, each pinna with 2-8 pairs of leaflets (terminal pinnae usually with the more

Fig. 92. *Pithecolobium saman*

numerous leaflets); petioles mostly 4-6 cm. long, canescent- or yellowish-tomentose, somewhat sulcate above; primary rachis (petiolar extension) 4-6 cm. long, similar to the petiole, bearing at or just below insertions of each pair of pinnae a small, sessile, subcupuliform, laterally extended gland; axis of the pinna like the primary rachis except the glands between (slightly below) insertions of the leaflet pairs smaller; leaflets asymmetrically ovate, oblong or obovate, up to about 4 cm. long and 2 cm. wide, obtuse or rounded apically, obliquely obtuse or rounded basally, puberulent or subglabrous and lustrous above, yellow-tomentulose below;

stipules caducous. Inflorescence of 1 to few pedunculate umbels axillary and subterminal on the branchlets; peduncles at anthesis 4–8 cm. long, tomentose, sulcate; umbels congested, the pedicels mostly 1–3 mm. long (except central flower sessile); bracts (except central flower) lanceolate, about 3 mm. long. Flowers whitish or pinkish, dimorphic; central (sessile) flower of umbel larger, persistent, its calyx campanulate, with 10 teeth, about 5 mm. long and 3–4 mm. wide, its staminal column gross and thick but the many stamens relatively short, its ovary ovulate but comparatively underdeveloped, this flower surrounded by 5 oblanceolate bracts about 5 mm. long; remaining (pedicellate) flowers first to fall, their calyx funnel-form, about 5 mm. long and only 1–2 mm. wide, 5-toothed, aureo-tomentose; their corolla funnell-form, about 1 cm. long, valvate, aureo-pubescent apically only; their stamens about 3.5 cm. long, the staminal-tube included; their ovaries sessile, subglabrous except pubescent at base of style, the style becoming more or less glabrous apically and about equalling the stamens. Legume linear or linear-oblong, reported as much as 20 cm. long and 2 cm. wide, straight or slightly curved, glabrate, the valves thick, the margins prominent, indented and septate between the seeds, the seeds transverse.

Mexico, Central America, South America: naturalized in West Indies and Old World tropics.

BOCAS DEL TORO: Almirante, *Cooper 442*. CANAL ZONE: several localities, sterile specimens. HERRERA: Divisa, *Allen 4433*. VERAGUAS: Santa Fe, *Allen 4437*.

A well-known and frequently abundant species in Central America, the leaves and pods of which are often relished by stock. The wood is of local importance and the pulp of the pods is said to be edible. The most common English name for this species is "rain tree."

SPECIES OF PITHECOLOBIUM OF DOUBTFUL OCCURRENCE IN PANAMA

PITHECOLOBIUM COGNATUM Benth.

Mamei railway station (*S. Hayes 166*; *Seemann s. n.*), fide Hemsl. Biol. Centr.-Am. Bot. 1:359. 1888.

The cited specimens, which I have not seen, are possibly *P. latifolium*. *P. cognatum* (as *Zygia cognata*), fide Britt. & Rose (N. Am. Fl. 23:39. 1928), is restricted to Mexico.

PITHECOLOBIUM FRAGRANS Benth.

Hacienda de San Juan, "Veraguas" (*Seemann 1190*), fide Benth. in Trans. Linn. Soc. 30:592. 1875; and Hemsl. Biol. Centr.-Am. Bot. 1:360. 1888.

This species is regarded as a new genus, *Pseudalbizzia* by Britton & Rose (N. Am. Fl. 23:48. 1928), and is according to them restricted to the West Indies. It has been variously interpreted as *Acacia Berteriana*, *Inga fragrans*, *Pithecolobium Berteriana*, *Acacia Balbisii*, *Acacia littoralis*, *Albizzia Berteriana*, etc. Without seeing the Seemann specimen it is impossible to know to what entity Britton &

Rose refer this Panamanian specimen, since they restrict *Pseudalbizzia* to the West Indies. It is likely close to *Pitbecolobium costaricense* if really a *Pitbecolobium* (in the broad sense).

3. ENTEROLOBIUM Mart.

ENTEROLOBIUM Mart. in Flora 20:Beibl. 117. 1837.

Feuilléea Ktze. Rev. Gen. Pl. 1:182. 1891, in part.

Unarmed trees, usually large, the branchlets pubescent or glabrous. Leaves bipinnate, moderate or large, 2- or few-ranked; petiole prominent, bearing a gland usually near the middle; pinnae few to many, opposite, the rachis bearing glands especially terminally; leaflets usually numerous and small, inequilateral; stipules inconspicuous, caducous. Inflorescence of solitary to fasciculate pedunculate heads, axillary, or paniculate by insertion at defoliate nodes; peduncles slender; heads small, globular; flowers condensed, sessile, small; bracts small and inconspicuous. Flowers whitish; calyx campanulate to tubular-funnelform, valvate, briefly 5-dentate; corolla more or less funnelform, 5-lobed, valvate, about double the calyx; stamens 10 to many, exceeding the corolla, united below into a short, included staminal tube; anthers small, eglandular, quadrangular; ovary sessile, several-ovulate; style slender, equalling or exceeding the stamens, the stigma small. Legume diagnostic, circinnate or reniform, coiled into a complete or nearly complete circle, compressed or almost flattened but nevertheless somewhat fleshy, usually glabrous and lustrous, fairly broad, ligneous, indehiscent, septate between the seeds, the seeds transverse.

Mexico to Argentina. Introduced into Pacific Islands and elsewhere.

This small American genus (8 or less species, mostly South American) is retained separate from *Pitbecolobium* (and *Albizzia*) following traditional practice. Nearly all students of the group have realized that *Enterolobium* probably constitutes no more than a section of *Pitbecolobium* (in the broader sense), but for convenience have retained the genera separate. Morphologically the distinctiveness of *Enterolobium* rests mostly with the unusual, coiled legume.

- | | |
|--|--------------------|
| a. Flower uniformly and densely ferruginous-tomentulose; petiole, rachis, and peduncle ferruginous-tomentulose; leaflets up to 60 or more pairs per pinna, only 2-4 mm. long..... | 1. E. SCHOMBURGKII |
| 2a. Calyx and corolla canescent-tomentulose at tips of lobes; petiole, rachis, and peduncle usually subglabrous, not ferruginous; leaflets 15-30 pairs per pinna, 8-15 mm. long..... | 2. E. CYCLOCARPUM |

1. ENTEROLOBIUM SCHOMBURGKII Benth. in Trans. Linn. Soc. 30:599. 1875.

Pitbecolobium Schomburgkii Benth. in Hook. Lond. Jour. Bot. 3:219. 1844.

Feuilléea Schomburgkii Ktze. Rev. Gen. Pl. 1:189. 1891.

Slender, erect tree, the branchlets ferruginous-tomentulose or puberulent. Leaves moderate, twice-compound, 2-ranked, the leaflets very small; petioles mostly 2-3 cm. long, terete, ferruginous-tomentulose, bearing an ovoid, sessile gland on the upper surface more or less at the middle; rachis usually 6-20 cm. long, fer-

Fig. 93. *Enterolobium Schomburgkii*

ruginous-tomentulose, ridged above along the center, bearing a small prominence or gland between or just below insertion of all or most pairs of pinnae; pinnae generally about 20 pairs, opposite or subopposite, the pinnular rachis mostly 4-7 cm. long, bearing glands (hidden by leaflets) between insertion of the terminal 1 to few pairs of leaflets; leaflets many (about 60?) pairs per pinna, linear or linear-oblong, more or less falcate, only 2-4 mm. long, obliquely rounded basally, inequilaterally obtuse or acute apically, the costa excentric, glabrous above, pubescent below; stipules early caducous. Inflorescence of 1 to few pedunculate heads from several foliate or defoliate nodes of the terminal branchlets; peduncles about 2 cm. long, ferruginous-tomentulose; heads globular, about 1 cm. in diameter (in bud), many-flowered; bracts minute. Flowers small, sessile, whitish; calyx funnelform, about 2 mm. long, ferruginous-tomentulose without, valvate; corolla tubular-funnelform, about 4 mm. long, ferruginous-tomentulose without, valvate; stamens 10 (or more?), about 1 cm. long, the filaments united below for less than half their length into a short, included staminal tube; ovary pubescent, terete.

Legume completely coiled upon itself into a circle about 5–7 cm. in diameter, compressed or almost flattened, 2–3 cm. wide, glabrous.

Mexico and Guatemala to Brazil.

CHIRIQUÍ: San Felix, Pittier 5273. PANAMÁ: Cerro Jefe, Allen 3434; Rio Indio drainage, Barbour 1058.

By reason of the distinctive fruit, this species is graced with many local, often picturesque, common names (viz. Brazil—*orelha de macaco*, "monkey's ear"; *orelha de preto*, "nigger's ear"; etc., etc.). This species seems to have little commercial use in South America, although it is reported of value for lumber and ties in northern Central America. Except when in fruit this and the following species might be mistaken for *Albizzia caribaea* and *A. malacocarpa* or *A. idiopoda*.

2. *ENTEROLOBIUM CYCLOCARPUM* (Jacq.) Griseb. Fl. Brit. W. Ind. 226. 1861.

Mimosa cyclocarpa Jacq. Fragm. Bot. 30, t. 34, f. 1. 1801.

Inga cyclocarpa Willd. Sp. Pl. 4:1026. 1806.

?*Prosopis dubia* HBK. Nov. Gen. & Sp. 6:309. 1824, fide Benth.

Pithecolobium cyclocarpum Mart. in Flora 20²:Beibl. 115. 1837.

Mimosa Parota Sessé & Moc. Pl. Nov. Hisp. 257. 1887.

Peuillaea cyclocarpa Ktze. Rev. Gen. Pl. 1:184. 1891.

Spreading tree, often very large and buttressed on the trunk, the branchlets puberulent to glabrous, smooth. Leaves moderate, twice compound, few-ranked; petiole up to about 8 cm. long, subterete, swollen basally, glabrous or somewhat puberulent, bearing an ovoid gland on the upper side usually near the middle; rachis up to 15 or more cm. long, shallowly sulcate and submarginate above, glabrous or somewhat puberulent, bearing subcupular glands between the terminal and usually penultimate insertions of the pinnae; pinnae 4–15 pairs, opposite on the rachis, the pinnular rachis with sessile or partly sunken, oblong, concave glands near insertion of the terminal 1–4 pairs of leaflets; leaflets 15–30 pairs, opposite, small, inequilaterally oblong or oblong-subfalcate, 8–15 mm. long, obliquely rounded basally, obliquely acute-mucronate apically, subglabrous and dark above, appressed-puberulent and lighter below, the costa excentric; stipules not evident. Inflorescence of 1–3 pedunculate heads from several foliate or (more frequently) defoliate nodes of the young branchlets; peduncle 2–4 cm. long, puberulent or subglabrous; head globular, 10–15 mm. in diameter, multiflorate; bracts minute. Flowers small, sessile, whitish; calyx short tubular-campanulate, about 3 mm. long, puberulent or subglabrous on the tube, canescent-tomentulose on tips of the lobes, valvate in bud; corolla tubular-funnelform, 5–6 mm. long, subglabrous except canescent-tomentulose toward the tip, valvate in bud; stamens many, up to 12 mm. long, filaments united into a staminal tube for about half their length; anthers quadrangular, unappendaged; ovary glabrous, subsulcate laterally; style about equalling or slightly exceeding the stamens. Legume reniform, about 10 cm. across and 3–6 cm. wide, compressed, glabrous, lustrous, curved into a nearly complete circle.

Mexico to northern South America.

BOCAS DEL TORO: Changuinola Valley, Cooper & Slater 94. CANAL ZONE: Balboa, Standley 3084 (sterile). CHIRIQUÍ: Progreso, Cooper & Slater 283 (sterile). COCLÉ: La Venta, Muenscher 16326; Penonomé, Williams 288. PANAMÁ: Chepo, Kluge 35; Punta Paitilla, Piper 5139.

The species apparently grades into *E. timbouva* Mart. of eastern and southern South America. *E. cyclocarpum* is said to have a number of local uses, such as the pulp of the fruit for food and as a soap substitute, a gum from the trunk as a remedy, and the wood of the harder specimens, easily worked and polished and seasoning well, as a decorative or cabinet wood. Except in fruit the species may easily be confused with *Albizzia malacocarpa* and *A. idiopoda* (northern Central America): the leaflets in these species of *Albizzia*, however, are not as markedly mucronate apically as with *E. cyclocarpum*.

4. *ALBIZZIA* Durazzini

ALBIZZIA Durazz. Mag. Tosc. 3:11. 1772.

Sericandra Raf. Sylva Tellur. 119. 1838.

Serianthes Benth. in Hook. Lond. Jour. Bot. 3:84. 1844.

Besenna A. Rich. Tent. Fl. Abyss. 1:253. 1847.

Trees or shrubs, mostly unarmed, pubescent or glabrous. Leaves few-ranked, usually large, bipinnate, the pinnae and leaflets few to many pairs; petiole glandular, the gland usually borne near or below the middle, less frequently above the middle, but always below insertion of the lowermost pair of pinnae; petiolar gland concave, longitudinally oblong and sunken in the petiole to orbicular and erect; rachis and pinnular rachis usually also bearing glands, especially towards the tips; leaflets small and linear to moderate and ovate, variously pubescent; stipules usually caducous or lacking. Inflorescence of usually subterminal, axillary, pedunculate heads, spikes, or umbels. Flowers pentamerous, synsepalous and sympetalous, regular, almost invariably perfect, white to pink; calyx campanulate to tubular, toothed apically, usually pubescent; corolla mostly funnelform, valvate; stamens numerous, united below into a staminal tube which is usually included; anthers small, eglandular. Legume linear to oblong, relatively broad but very flat and thin, straight, dry, not septate, indehiscent or tardily dehiscent, the valves never contorted nor elastically dehiscent, the seeds transverse.

Pantropical but relatively rare in the New World.

Albizzia is primarily an Old World genus, scarcely distinguishable from *Enterolobium* and *Pithecolobium* (primarily New World). The traditional means of distinguishing the genus (on basis of the legume) is highly inconvenient. New supplementary characters are thus utilized here (especially position of glands: whether on petiole or rachis only) which seem definitely more practical in separating *Albizzia* from *Pithecolobium*. Separation of *Albizzia* from *Enterolobium* is more difficult in the absence of fruit, but since few species are then involved individual specific characters usually serve to make determination possible. Certain

species of *Acacia* so resemble a few species of *Albizzia* that detailed examination of the stamens is necessary for determination.

- a. Leaflets small and narrow (5-11 mm. long and about 2 mm. wide), numerous (9-50 pairs per pinna).
 - b. Leaflets less than 30 pair per pinna, pubescent; mature peduncles 2-3 cm. long; flowers relatively large (calyx about 2.5 mm. long)..... 1. *A. CARBONARIA*
 - bb. Leaflets usually 30 or more pairs per pinna, glabrous; peduncles less than 1.5 cm. long; flowers small (calyx about 1 mm. long)..... 2. *A. CARIBAEA*
- aa. Leaflets larger and broader (mostly 15-40 mm. long and 10-20 mm. wide), few or several (2-9 pairs per pinna).
 - b. Leaflets tapered and bluntly acute apically; flowers sessile..... 3. *A. ADINOCEPHALA*
 - bb. Leaflets obtuse or rounded to emarginate apically; flowers pedicellate.
 - c. Flowers all alike, short-pedicellate (pedicels mostly about 2 mm. long); mature leaflets, young twigs, and legume sparingly pubescent or glabrous..... 4. *A. LEBBECK*
 - cc. Flowers dimorphic, all except center one long-pedicellate (pedicels 8-15 mm. long); mature leaflets, young twigs, and legume tomentose to moderately pubescent..... 5. *A. LONGEPEDATA*

1. *ALBIZZIA CARBONARIA* Britton ex Britt. & Wils., *Scientif. Surv. Porto Rico & Virgin Isl.* 6:348. 1926.

Albizzia malacocarpa Standl. ex Standl. & Cald. *Fl. Salv.* 96. 1925 (hyponym); Britt. & Rose, in *N. Am. Fl.* 23:44. 1928, fide Britt. & Killip.

Moderate or large tree, the branchlets tomentose when young becoming glabrous, moderately lenticellate, unarmed. Leaves moderately large, bipinnate, the pinnae 7-15 pairs opposite on the rachis, the leaflets 10-25 pairs per pinna; petioles mostly 2-3 cm. long, tomentulose, nearly terete, usually eglandular; primary rachis up to 10 cm. long, similar to the petiole, bearing at the apex at insertion of terminal pair of pinnae a sessile, subcupular gland; pinnular rachis 2-5 cm. long, puberulent, usually bearing a sessile gland at insertion of the terminal pair of leaflets; leaflets opposite, oblong-subfalcate, 4-6 mm. long and 1-2 mm. wide, asymmetrically acute apically, obliquely rounded or subtruncate basally, pubescent above and more heavily so below, somewhat paler below, the costa excentric, the venation obscure; stipules early caducous. Inflorescence of several pedunculate umbels from terminal and subterminal defoliate or minutely foliate nodes; peduncles slender, up to 3 cm. long, tomentulose; bractlets linear-spatulate, caducous. Flowers briefly pedicellate, dense; calyx narrowly obconic, about 2.5 mm. long, tomentulose; corolla narrowly funnelform, about 5 mm. long, tomentose, the lobes $\frac{1}{2}$ the length of the tube; stamens about 14 mm. long, the staminal tube well included; ovary glabrous. Legume broadly linear, 8-11 cm. long and almost 2 cm. wide, stipitate, pubescent, falsely septate, the seeds transverse.

Salvador, Panama, and Colombia.

DARIÉN: Cana, Williams 952.

A. malacocarpa was described in part (flowers) from a Panama specimen (Williams 952). On the basis of certain characteristics *A. carbonaria* might well be considered *Pithecolobium* (or *Samanea*, if this be recognized as distinct from *Pithecolobium*) instead of *Albizzia*. Yet the legume better fits *Albizzia*.

2. *ALBIZZIA CARIBAEA* (Urban) Britt. & Rose, in N. Am. Fl. 23:44. 1928.*Pithecolobium caribaeum* Urban, Symb. Ant. 2:260. 1900.

Moderate to tall tree, the branchlets puberulent or almost glabrous, inconspicuously lenticellate. Leaves large, bipinnate, the pinnae 5-10 pairs, opposite, the leaflets 30-50 pairs; petiole 1-5 cm. long, terete except sulcate above, more or less puberulent, bearing above near the middle an orbicular gland concave above; rachis up to 18 cm. long, similar to the petiole, frequently glandular at the upper 1 to few rachial nodes; pinnular rachis about 6 cm. long, similar, eglandular; leaflets inequilaterally linear, 5-11 (usually 7-8) mm. long and 1-2 mm. wide, subtruncate and oblique basally, asymmetrically obtuse apically, glabrous, the costa excentric; stipules caducous or lacking. Inflorescence of subterminal, axillary, pedunculate heads; peduncles short, 6-15 mm. long, pubescent or subglabrous; heads globose, the bracts minute. Flowers small, pink, sessile; calyx turbinate, about 1 mm. long, puberulent-pilous; corolla funnelform, about 4 mm. long, subglabrous; stamens about 1 cm. long, the staminal tube included; ovary glabrous or shortly pilose apically, several ovulate. Legume linear, usually about 10 cm. long and 1.5-2.5 cm. wide, straight, flat and thin, the margins elevated, glabrous or subglabrous, transversely striate, the seeds transverse.

West Indies; north coast of South America, and lower Central America.

SAN BLAS: Puerto Obaldía, Pittier 4326.

This species is distinguished from most species of the genus in Panama by the fine "fern-like" foliage and short-pedunculate heads. Unless in fruit it is easily mistaken for *Enterolobium*: however, the leaflets are somewhat larger than is the case with *E. Schomburgkii* and somewhat smaller than is usual for *E. cyclocarpum*, the only two species of *Enterolobium* occurring in Panama.

3. *ALBIZZIA ADINOCEPHALA* (Donn. Smith) Britt. & Rose ex Record in Trop. Woods 10:22. 1927.*Pithecolobium adinocephalum* Donn. Smith, in Bot. Gaz. 57:419. 1914.*Pithecolobium discolor* Pittier, in Contr. U. S. Nat. Herb. 20:464. 1922, not Britton.

Large forest tree, the branchlets glabrous except at the extreme tips and somewhat corky or irregular. Leaves large, bipinnate, the pinnae (1) 2-3 pairs opposite on the rachis, the leaflets (2) 3-4 (5) pairs per pinna; petiole slender, 2-8 cm. long, terete, glabrous or lightly puberulent, swollen basally, bearing a longitudinally elongate, concave gland sunken in the upper surface of the petiole below the middle; primary rachis similar to the petiole, eglandular, longitudinally sulcate above; pinnular rachis similar, except bearing glands like that of the petiole at the upper pinnular nodes; leaflets opposite, ovate-lanceolate to ovate-elliptic, mostly 2-4 cm. long and 1-2 cm. wide, bluntly acute apically, mostly obtuse basally, dull and lightly puberulent above, lighter and puberulent below, the veins very prominent and reticulate above; stipules apparently lacking. Inflorescence a terminal or subterminal panicle, the ultimate divisions capitate from slender, puberulent,

ebracteolate peduncles; heads several-flowered, dense, minutely bracteolate. Flowers small, white, fragrant; calyx funnelform, little more than 1 mm. long, silvery-pubescent above, the teeth small; corolla funnelform, about 3 mm. long, puberulent or subglabrous, the teeth as long as the tube; stamens many, about 1 cm. long, glabrous, the staminal tube about equalling the corolla; ovary glabrous. Legume broadly linear, 10–17 cm. long and 1.5–2.0 cm. wide, flat and thin, glabrous, transversely striate, dehiscent, 10- to 13-seeded.

British Honduras and Salvador to Panama.

CANAL ZONE: Ancón, Pittier 5737; Balboa, Standley 26045. PANAMÁ: Culebra Island, Hayes 28; sterile specimens from Standley afford many other records from the Canal Zone and nearby Panama.

A fairly common tree of Central America, much resembling certain species of *Leucaena*.

4. *ALBIZZIA LEBBECK* (L.) Benth. in Hook. Lond. Jour. Bot. 3:87. 1844.

Mimosa Lebeck L. Sp. Pl. 516. 1753.

Mimosa speciosa Jacq. Ic. Pl. Rar. 1:19, pl. 198. 1786.

Acacia Lebeck Willd. Sp. Pl. 4:1066. 1806.

Feuilltea Lebeck Ktze. Rev. Gen. Pl. 1:184. 1891.

Many additional synonyms are given by Benthham (Trans. Linn. Soc. 30:562. 1875) for this Old World species.

Small or moderate, spreading tree, the branchlets puberulent when young soon becoming glabrous, conspicuously white-lenticellate. Leaves moderately large, mostly bipinnate, the pinnae 2–4 pairs opposite on the rachis, the leaflets 4–9 pairs; petiole 2–10 cm. long, glabrous, bearing on the upper side below the middle a sessile, oblong, concave gland; primary rachis similar to the petiole, sulcate above, often bearing a sessile, scutelliform gland at insertion of the upper pair of pinnae; pinnular rachis similar, bearing at or just below the upper 2–3 rachial nodes glands like the gland of the petiole; leaflets opposite, asymmetrically oblong, 2–4 cm. long and mostly 1–2 cm. wide, rounded-subtruncate to obtuse apically, obtuse and very inequilateral basally, essentially glabrous above and below. Inflorescence of many long-pedunculate umbels axillary from the subterminal nodes (2–3 per node); peduncles 3–10 cm. long, sparingly puberulent; umbels dense, globose, the pedicels mostly about 2 mm. long, the bractlets minute. Flowers cream-colored, fragrant; calyx funnelform, about 4 mm. long, unequally toothed or cleft, golden-tomentulose apically; corolla funnelform, 6–7 mm. long, puberulent, the teeth prominent; stamens many, as much as 3 cm. long, glabrous, the staminal tube well included; ovary glabrous. Legume broadly linear or narrowly oblong, usually 15 or more cm. long and 3–5 cm. wide, very thin and dry, glabrous, thinly margined, transversely striate; seeds few, transverse.

Native to Africa and Asia, introduced into various parts of the New World tropics.

CANAL ZONE: Colón, Pittier 6672.

The popular name "woman's tongue" is given this species. It is quite common in the West Indies, more so than on the Central American mainland. In fruit it may be confused with species of *Leucaena*.

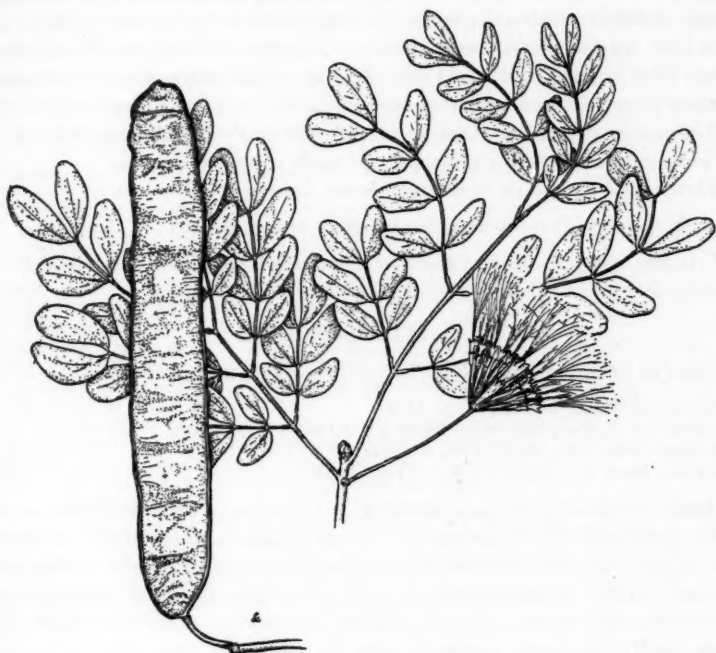


Fig. 94. *Albizzia longepedata*

5. *ALBIZZIA LONGEPEDATA* (Pittier) Britt. & Rose, ex Record in Trop. Woods 11:14. 1927.

Pithecolobium longepedatum Pittier, in Contr. U. S. Nat. Herb. 20:464. 1922.

Samanea Samanigua Pittier, in Bol. Cient. y Tecn. Mus. Com. Venez. 1:54. 1925.

Large tree, the young branchlets brownish-tomentose. Leaves large, bipinnate, the pinnae 2-6 (usually 3-4) pairs opposite on the rachis, the leaflets 3-7 pairs per pinna; petioles usually 3-4 cm. long, brownish-tomentose, bearing a sessile, concave, patelliform gland on the upper side near or slightly above the middle; rachis 3-15 cm. long, similar to the petiole, often with sessile, concave glands at or below insertion of the pairs of pinnae; pinnular rachis similar, bearing small glands below the rachial nodes; leaflets ovate to obovate, 15-40 mm. long and 10-25 mm. wide, rounded to subcuneate and somewhat oblique basally, rounded or emarginate apically, opposite, softly pubescent above and more densely so below, the venation

prominent above; stipules linear, caducous. Inflorescence of pedunculate umbels axillary from the subterminal nodes (1-3 per node); peduncle 3-9 cm. long, brownish-tomentose; pedicels slender, 8-15 mm. long, tomentose; bractlets linear, slender, early caducous. Flowers whitish, in many-flowered umbels, dimorphic, the central flower sessile and gross; calyx funnelform, 6-7 mm. long (tubular and 10-12 mm. long in central, sessile flower), tomentose; corolla funnelform, about 10 mm. long (tubular and 20-25 mm. long in central, sessile flower), tomentose, the teeth prominent and acute; stamens about 35 mm. long, the staminal tube included; ovary pubescent. Legume broadly linear, 15-20 cm. long and 2.5-3.5 cm. wide, pubescent, tardily dehiscent, the seeds several, transverse.

Salvador and Guatemala to northern South America.

CANAL ZONE: R. Pequení, Steyermark & Allen 17155.

This species is quite distinct from other species of *Albizzia* in Panama, differing primarily by its pronouncedly umbellate, long-pedicellate flowers.

5. CALLIANDRA Benth.

CALLIANDRA Benth. in Hook. Jour. Bot. 2:138. 1840, nom. conserv.

Anneslia Salisb. Parad. Lond., pl. 64. 1807.

Inga Annesleya G. Don, Gen. Hist. Dichl. Pl. 2:396. 1832, in part.

Clelia Casar. Nov. Stirp. Brasil. Dec. 83. 1845.

Codonandra Karst. Fl. Columb. 2:43, t. 122. 1862.

Usually shrubs or small trees, unarmed except in one or two (non-Panamanian) species, mostly not heavily pubescent. Leaves bipinnate, the pinnae 1 to several pairs; leaflets 1 to many pairs per pinna; petiole and rachis eglandular; leaflets large and broad (ovate) or more frequently small and narrow (linear or linear-oblong), glabrous in most species, frequently ciliate marginally, almost invariably very oblique basally, the costa prominent, but the secondary veins obscure in many species; stipules mostly striate and subpersistent. Inflorescence commonly of axillary, pedunculate spikes, sometimes a terminal raceme or panicle. Flowers in dense, globose heads, sometimes dimorphic (center flower of head larger or more gross, sometimes sterile), normally 5-parted and perfect, regular, sympetalous; calyx relatively broad, mostly cupulate or campanulate; corolla usually funnelform, never narrow and tubular like species of *Inga* and *Pithecolobium*, usually lobed for about half its length, the lobes valvate; stamens many, elongate, conspicuous and showy, obscuring the corolla, united below into an included or exerted staminal tube; anthers small, usually eglandular; ovary usually sessile, glabrous, several-ovulate, the style filiform, the stigma terminal. Legume broadly linear, straight or nearly so, gradually constricted baseward and thus cuneate-substipitate, flat and thin, the margins elevated, bivalvate, the valves elastically dehiscent from the apex but not twisting, not septate, the seeds (obliquely) transverse or nearly longitudinal.

Primarily a New World genus, extending from southwestern United States and Mexico to southern South America: one or two Oriental or African species have

at times been recognized.

The genus is fairly distinctive and seemingly quite natural. It is especially characterized by the glandless petiole and rachis, the dense heads of "exserted stamens" and the distinctive, elastically dehiscent legume. Specific boundaries within the genus are for the most part indistinct and often artificial. Several readily identifiable complexes can be distinguished, and within these a great many of the species can be united with profit. Probably not more than 20 or 25 "good" species occur in all Central America, most of these in the northern part. Eight species are here recognized from Panama, one of which is questionably recorded.

- a. Leaflets normally 3 per pinna, comparatively large and broad (about 1 cm. wide); pinnae 1 pair.
 - b. Flowers large (corolla about 13 mm. long, stamens 6-7 cm. long); staminal tube well exserted (about 4 cm. long); peduncles thick..... 1. *C. GLABERRIMA*
 - bb. Flowers smaller (corolla about 6 mm. long, stamens 2-2.5 cm. long); staminal tube included; peduncles slender..... 2. *C. SEEMANNI*
- aa. Leaflets few to many per pinna, comparatively small (never more than a few mm. wide); pinnae 1 to several pairs.
 - b. Inflorescence of axillary, pedunculate heads; pinnae 1-11 pairs.
 - c. Pinnae a single pair..... 3. *C. MAGDALENAE*
 - cc. Pinnae 2-11 pairs.
 - d. Corolla essentially glabrous; leaflets membranaceous, dull, the secondary veins obscure.
 - e. Branchlets terete; flowers rather small..... 4. *C. CARACASANA*
 - ee. Branchlets quadrangular, markedly angled; flowers larger..... 5. *C. TETRAGONA*
 - dd. Corolla pubescent; leaflets thicker, often subcoriaceous, darker or more lustrous above, venation more or less evident as far as known.
 - e. Pinnae 2-6 pairs; leaflets usually 10-25 pairs, 4-7 mm. long; corolla about 8 mm. long..... 6. *C. CUMINGII*
 - ee. Pinnae mostly 7-11 pairs; leaflets normally 20-65 pairs, mostly 3-5 mm. long; corolla 5-6 mm. long..... 7. *C. PITTIERI*
 - bb. Inflorescence a terminal raceme or panicle; pinnae several to many (usually about 15) pairs..... 8. *C. CONFUSA*

1. *CALLIANDRA GLABERRIMA** (Benth.) Britt. & Killip, in Ann. N. Y. Acad. Sci. 35:134. 1936.

Calliandra glyphoxylon var. *glaberrima* Benth. in Trans. Linn. Soc. 30:539. 1875.

Small tree or shrub?, the branchlets essentially glabrous, striate, callous but hardly lenticellate. Leaves moderately small, bipinnate, the pinnae only 1 pair, the leaflets 3 (2-4?) per pinna; petioles mostly 1-2 cm. long, subglabrous, sulcate above, eglandular, apiculate apically from the lower side; pinnular rachis similar to the petiole; leaflets oblong-falcate, the terminal pair mostly 2-4 cm. long and about 1 cm. wide, the lower leaflet usually half or less this size, blunt or bluntly acute apically and minutely mucronulate, very obliquely obtuse or rounded basally, glabrous and lustrous above and below, sparingly ciliate on the margins, the 2-3 main veins palmate, smaller veins conspicuously reticulate, coriaceous; stipules ovate, 1-2 mm. long, longitudinally striate, subpersistent. Inflorescence of axillary, pedunculate heads; peduncles about 1 cm. long; heads dense; bracts more or less ovate, little more than 1 mm. long, persistent. Flowers large, red; calyx campanulate, 2-3 mm. long, striate, glabrous, the teeth short and broad; corolla funnel-

form, about 13 mm. long, glabrous; stamens as much as 6-7 cm. long, united below into a glabrous staminal tube often about 4 cm. long, thus strongly exserted; ovary glabrous, tapered basally. Legume typical of the genus.

Colombia and Panama.

CANAL ZONE: R. Indio, *Dodge & Allen 17370*. COCLÉ: Bismarck, *Williams 141*. PANAMÁ: north of Panama City, *Bro. Paul 612*.

A few South American species, including *C. carbonaria*, are similar to our Panamanian specimens, and with additional collections may possibly prove to grade into this species and/or into one another. Knowing how variable species in this group may be, we have refrained from describing as new the *Dodge & Allen 17370* specimen cited, even though its flowers are considerably larger than is typical for *C. glaberrima* or other related species examined. The description here given is taken mostly from the *Dodge & Allen 17370* specimen and is not necessarily "typical" of *C. glaberrima*.

C. glaberrima is allied to the well-known *C. emarginata* of northern Central America and Mexico, and to other species of Britton & Rose's TERGEMINAE. The TERGEMINAE as constituted by Britton and Rose is a highly unworkable complex of doubtful entities. Seemingly it should be condensed into a half-dozen or less species. In spite of marked variability in the species, none of the Mexican or Central American ones possess flowers nearly so large as those of our Panamanian citation.

C. glaberrima, along with *C. Seemanni* and its extra-Panamanian allied species, are easily distinguished from all other species of *Calliandra* in Panama by the bipinnular, few-foliolate leaves with relatively large leaflets. Larger flowers and extremely exserted staminal tube serve readily to distinguish *C. glaberrima* from *C. Seemanni*.

2. *CALLIANDRA SEEMANNI* Benth. in Seem. Bot. Voy. Herald, 116, pl. 22. 1853.

Feuilléea Seemanni Ktze. Rev. Gen. Pl. 1:189. 1891.

Anneslia Seemanni Britt. & Rose, in N. Am. Fl. 23:54. 1928.

Large shrub or small tree?, the branchlets glabrous or lightly canescent-puberulent. Leaves moderately small, bipinnate, the pinnae a single pair, the leaflets 1 pair (plus a third smaller leaflet below to the outside) per pinna; petiole slender, up to 2 cm. long, essentially glabrous, sulcate above, eglandular, apiculate from below terminally; pinnular rachis similar to the petiole; leaflets obliquely oblong, mostly 2-4 cm. long and about 1-1.5 cm. wide, obtuse to acute apically, rounded and very inequilateral basally, with one chief nerve and two smaller nerves palmate from the base, the secondary venation reticulate, glabrous except usually ciliolate on the margin; stipules lanceolate, small. Inflorescence of axillary, pedunculate heads; peduncles slender, mostly 2-3 cm. long; heads several-flowered, globular; floral bracts lanceolate, subpersistent. Flowers dense; calyx narrowly cupulate, about 2 mm. long, glabrous, striate, the teeth prominent; corolla funnelform,

about 6 mm. long, glabrous; stamens 2–2.5 cm. long, united below into an included staminal tube. Legume broadly linear, up to 10 cm. long and about 1 cm. wide, glabrous, the few brown seeds reported white-dotted.

Reported from northern South America (erroneously from Colombia, fide Britton & Killip); Costa Rica?

The species is based upon a Seemann collection from Veraguas, Panama. The type (the only Panamanian record) has not been available for examination, but is well illustrated with the original description: it is strongly suspected that the species is merely a variant of the older *C. emarginata* (which in turn is probably scarcely separable from *C. tergemina*), and incorporation under one of these names may eventually be in order. As mentioned under discussion of *C. glaberrima*, it seems impossible to accept Britton & Rose's inordinate splitting of the TERGEMINAE, into which section the doubtfully distinct *C. Seemanni* falls.

3. *CALLIANDRA MAGDALENAE* (Bert.) Benth. in Lond. Jour. Bot. 5:102. 1846.

Acacia Magdaleneae Bert. ex DC. Prodr. 2:455. 1825.

Feuilléea Magdaleneae Ktze. Rev. Gen. Pl. 1:188. 1891.

Calliandra riparia Pittier, Arbol. y Arbust. Legum. Dec. 6–8:80. 1927.

Anneslia Magdaleneae Britt. & Rose, in N. Am. Fl. 23:60. 1928.

Anneslia Tonduszii Britt. & Rose, loc. cit. 61. 1928.

Anneslia chiapensis Britt. & Rose, loc. cit. 1928.

Calliandra Schultzzei Harms, in Fedde Rep. Sp. Nov. 24:209. 1928.

Calliandra Tonduszii Standl. in Field Mus. Publ. Bot. 4:309. 1929.

Calliandra angustidens Britt. & Killip, in Ann. N. Y. Acad. Sci. 35:134. 1936.

Tree to 10 m. tall, the branchlets somewhat ascending-pubescent when young, becoming glabrous in age. Leaves moderate, bipinnate, the pinnae 1 pair, the leaflets several (usually 10–20) per pinna; petiole short, about 1 cm. long, terete, tomentulose, eglandular, bearing terminally an apicule from the lower side; pinular rachis 5–9 cm. long, ridged and tomentose above; leaflets linear-ovate or linear-lanceolate to linear-oblong, mostly about 1 cm. long and 3 mm. wide, broadly acute or sometimes obtuse apically and minutely mucronulate, obliquely truncate basally, glabrous above and below, lustrous above, often ciliate, the costa slightly excentric, 1–2 minor veins palmate from the base, secondary veins prominently reticulate; stipules lanceolate, 3–6 mm. long, striate, subpersistent. Inflorescence of axillary, pedunculate heads; peduncles about equalling petioles, puberulent; floral bracts lanceolate, quite small, persistent. Flowers rose-red, several in dense globular heads; calyx funnelform-campanulate, about 2 mm. long, glabrous, striate; corolla funnelform, 5–7 mm. long, glabrous, the lobes prominent; stamens in age 2.5 or more cm. long, the staminal tube about equalling the corolla. Legume linear-oblong, reported up to 14 cm. long and about 1 cm. wide, pubescent when young, said to be (erroneously?) glabrous at maturity.

As here interpreted (broadly), southern Mexico, Central America to northern South America.

CHIRIQUÍ: Progreso, Cooper & Slater 318; Remedios, Allen 3666; San Felix, Allen 1958; R. Tinta, Woodson, Allen & Seibert 401. VERAGUAS: Soná, Allen 1040.

While the species assumes a fairly constant form in Panama, it grades into a number of variants in northern Central America and Mexico, and in northern South America. As a result numerous bipinnular "species" have been described which are nearly impossible to delimit precisely. South American (Colombian) specimens taken by Britton & Killip to be *C. Magdalenae* may appear quite different from those of northern Central America and even Panama. On the other hand, there seems little doubt that the Colombian *C. Schultzei* is the same species as our Panamanian citations. Yet Bentham cites a Seemann collection (as being *C. Magdalenae*) from the same province as the Allen 1040 collection. With uncertainty as to the exact boundaries of *C. Magdalenae*, a few possible and probable synonyms have been combined for practical reasons under the oldest name. Should *C. Schultzei* in reality be distinct from *C. Magdalenae*, both it (on the basis of recent collections) and *C. Magdalenae* (solely on the basis of Bentham's citation) would have to be considered as occurring in Panama.

4. *CALLIANDRA CARACASANA* (Jacq.) Benth. in Trans. Linn. Soc. 30:543. 1875.

Mimosa caracasana Jacq. Coll. 4:142. 1790.

Acacia caracasana Willd. Sp. Pl. 4:1068. 1806.

?*Calliandra portoricensis* Benth. in Hook. Lond. Jour. Bot. 3:99. 1844. (For numerous synonyms to this species see Benth. in Trans. Linn. Soc. 30:543. 1875.)

Fenillea caracasana Ktze. Rev. Gen. Pl. 1:187. 1891.

Anneslia caracasana Britt. & Rose, in N. Am. Fl. 23:65. 1928.

Calliandra Torona Britt. & Rose, in Ann. N. Y. Acad. Sci. 35:137. 1936.

Shrub or weak slender tree, the branchlets puberulent to glabrous. Leaves moderately large, bipinnate, the pinnae 2-6 (mostly 4-5) pairs, the leaflets 10-35 pairs; petiole slender, 1-3 cm. long, glabrous or nearly so, eglandular; rachis mostly 3-4 cm. long, similar to the petiole, bearing a terminal apicule from the lower side; pinnular rachis up to 7 cm. long, glabrous except frequently puberulent above; leaflets linear or linear-oblong and more or less straight, mostly 6-8 mm. long and about 1 mm. wide, obtuse or somewhat acute apically, asymmetrically rounded or subtruncate basally, glabrous (in age) or pubescent, dull above and below, the costa somewhat excentric, other veins obscure; stipules lanceolate, 3-6 mm. long. Inflorescence of axillary, pedunculate heads; peduncles slender, 2-5 cm. long or even longer, glabrous or puberulent; floral bracts minute, usually ciliate; head small, several-flowered, globular. Flowers whitish or pinkish; calyx funnelform-campulanate, scarcely more than 1 mm. long, subglabrous; corolla broadly funnelform, little more than 2 mm. long, glabrous or subglabrous; stamens about 16 mm. long, the staminal tube included. Legume broadly linear, about 8 cm. long and almost 1 cm. wide, constricted basally, glabrous or lightly puberulent.

Venezuela to Ecuador; Panama. "Species" probably conspecific with *C. caracasana* if broadly regarded, occur in Mexico, northern and middle Central America and the West Indies.

CHIRIQUÍ: R. Chiriquí Viejo, P. White 342.

The *White 342* specimen cited (fruit only) is in rather poor condition. It seems identical with *C. tetragona* and logically should be cited as *C. tetragona*, except for the absence of the characteristic stem angulations, a character possibly of little genetic weight. Even if this specimen be regarded as *C. tetragona*, the entity represented by *C. caracasana* is to be expected in Panama. *C. portoricensis* has been distinguished from the usually slighter *C. caracasana* in reportedly having white stamens while the latter has pink, red, or purple stamens. This characteristic, in view of morphological intergradation, seems of dubious value for specific distinction. Benth himself states (*Trans. Linn. Soc.* 30:543. 1875) concerning *C. caracasana*: "The six preceding species [*C. portoricensis* is the first preceding one and *C. tetragona* the first subsequent one], however, are very closely allied to each other, and might almost be classed as varieties of a single species." Monographic work is sorely in need here and will likely show a widespread, variable complex centered in these tropical American species, in which speciation has not as yet segregated clear-cut entities.

5. *CALLIANDRA TETRAGONA* (Willd.) Benth. in Hook. *Lond. Jour. Bot.* 2:139. 1840.

Acacia tetragona Willd. *Sp. Pl.* 4:1069. 1806.

Mimosa quadrangularis Poir. in *Lam. Encycl. Meth. Suppl.* 1:72. 1810.

Acacia quadrangularis Link. *Enum. Hort. Berol.* 2:445. 1822.

Anneslia tetragona Donn.-Smith, *Enum. Pl. Guat.* 1:10. 1889.

Feuillécia tetragona Ktze. *Rev. Gen. Pl.* 1:189. 1891.

Calliandra portoricensis var. *multijuga* Micheli, in *Bot. Gaz.* 20:285. 1895, fide Britt. & Rose.

Shrub or small tree, the branchlets puberulent when young becoming glabrate, usually markedly quadrangular, longitudinally striate, scarcely lenticellate. Leaves moderately large, bipinnate, the pinnae 4-8 pairs opposite on the rachis, the leaflets 15-35 pairs per pinna; petiole mostly 2-3 cm. long, puberulent or subglabrous, angled, somewhat sulcate or ridged above, eglandular; rachis similar to the petiole, often bearing tufts of hair at insertion of the pinnae; pinnular rachis 3-8 cm. long; leaflets linear to linear-oblong, nearly straight, mostly about 8 mm. long and little more than 1 mm. wide, obtuse or somewhat acute apically, asymmetrically rounded to truncate basally, glabrous or ciliate on the margin, dull above and below, the costa somewhat excentric, the other veins obscure; stipules narrowly lanceolate, about 6 mm. long, striate, subpersistent. Inflorescence of 1 to few pedunculate heads from the upper axils, the terminal and subterminal nodes frequently defoliate; peduncles elongate, not uncommonly 7-8 cm. long in age, similar to the petiole; heads dense, several-flowered, globular; floral bracts minute. Flowers white; calyx funnelform-campanulate, about 2 mm. long, subglabrous, the teeth acute; corolla funnelform, about 6 mm. long, glabrous; stamens 3 cm. long or longer, the staminal tube included. Legume up to 12 cm. long and about 1 cm. wide, glabrous, otherwise typical of the genus.

Southern Mexico to northern South America.

Fig. 93. *Calliandra tetragona*

CHIRIQUÍ: Boquete, Pittier 3140; Hato del Jobo, Pittier 5423. COCLÉ: El Valle, Allen 3819; Hunter & Allen 357.

This species is distinguished, perhaps somewhat "unnaturally," by the tetragonal branchlets. Certainly some species normally identified as *C. portoricensis* or *C. caracasana* seem identical with *C. tetragona* except for the angled stem. It may be that a single or few-gene characteristic (angled stem) has appeared throughout the range of what might be called the *C. caracasana*-*C. portoricensis* complex. Yet this character is sufficient to distinguish (somewhat arbitrarily) this species from others of the genus.

6. *CALLIANDRA CUMINGII* Benth. in Hook. Jour. Bot. 2:140. 1840.

Inga speciosa Mart. & Gal. in Bull. Acad. Brux. 10²:320. 1843?, *side Ind. Kew.*

Feuilléea Cumingii Ktze. Rev. Gen. Pl. 1:187. 1891.

Anneslia Cumingii Britt. & Rose, in N. Am. Fl. 23:57. 1928.

Shrub, the branchlets puberulent or lightly pubescent, becoming glabrous in age. Leaves moderately small, bipinnate, the pinnae usually 2-3 pairs opposite on the rachis, the leaflets several to many pairs per pinna; petiole usually less than 1 cm.

long, lightly pubescent, eglandular; rachis 5–20 mm. long similar to the petiole, eglandular, bearing a terminal apicule from the lower side; pinnular rachis slender, up to 2 cm. long, puberulent, eglandular; leaflets linear-oblong or narrowly oblong, usually 4–7 mm. long and 1–2 mm. wide, blunt or obtuse and often minutely mucronate apically, obliquely rounded or subtruncate basally, sparsely pubescent or subglabrous, the costa slightly excentric, the venation fairly prominent below, somewhat lighter in color and duller below than above; stipules small, lanceolate-subulate. Inflorescence of pedunculate heads solitary or rarely geminate in the upper axils; peduncles 2–3 cm. long, lightly pubescent; floral bracts small, puberulent. Flowers in compact, several-flowered heads, pubescent or lightly pilose apically, purplish; calyx campanulate, 1–2 mm. long, pubescent on the teeth; corolla funnelform, about 8 mm. long, lightly pubescent with long hairs, the lobes about $\frac{1}{3}$ – $\frac{1}{4}$ the length of the tube; stamens about 2.5 cm. long, the staminal tube mostly included; ovary glabrous. Legume linear, up to 8 cm. long and about 8 mm. wide, puberulent?, dehiscent as typical of the genus.

Panama, Mexico?, northern South America?

PROVINCE UNKNOWN: without locality, *Cuming* 1248.

The species was described from a Panamanian collection by Cuming (1248), which we have not had opportunity to examine. No later collections from Panama have come to our attention. Bentham regarded Mexican and Venezuelan material as conspecific with *C. Cumingii*, but Britton and Rose have regarded the species as confined to Panama. The above description is pieced together from various incomplete descriptions of the species and certain herbarium sheets that presumably are (or are very similar to) *C. Cumingii*.

7. *CALLIANDRA* PITTIERI Standl. in Contr. U. S. Nat. Herb. 18:104. 1916.

Calliandra bella var. *Trianae* Benth. in Trans. Linn. Soc. 30:556. 1875.

Calliandra Lehmanii Harms, in Fedde Rep. Sp. Nov. 17:90. 1921.

Anneslia Pittieri Britt. & Rose, in N. Am. Fl. 23:63. 1928.

Small tree with flat crown, the branchlets sparingly appressed-pubescent or puberulent when young, becoming glabrous. Leaves moderate, bipinnate, the pinnae mostly 7–11 pairs opposite on the rachis, the leaflets several or many (20–65 pairs); petiole short, normally less than 1 cm. long, terete, puberulent, eglandular; rachis up to 9 cm. long, similar to the petiole; pinnular rachis 2–5 cm. long; leaflets small, linear or linear-oblong, 3–5 mm. long and less than 1 mm. wide, acute to obtuse apically, inequilaterally rounded basally, usually minutely ciliate but otherwise glabrous, the costa conspicuous and somewhat excentric, more or less lustrous on the upper surface; stipules linear-lanceolate, about 3 mm. long, persistent. Inflorescence of axillary, pedunculate heads; peduncles 1.5–4.5 cm. long, puberulent; heads few- to several-flowered, dense, spherical, the bracts small and subpersistent. Flowers red; calyx campanulate, little more than 1 mm. long, glabrous or puberulent, the teeth short and broad; corolla funnelform, 5–6 mm. long, pubescent; stamens about 3 cm. long, the staminal tube barely exerted.

Legume linear-spatulate, 5-8 cm. long and scarcely 1 cm. wide, pubescent, the margins thick.

Colombia and Panama.

DARIÉN: Caná, Williams 707.

This species, from a Colombian type (*Pittier 951*), was recorded in the original description as occurring also in Panama (Caná, Darién, Williams 707). Britton and Rose, in the N. Am. Fl., so accepted its range. However, Britton and Killip (Ann. N. Y. Acad. Sci. 35:136. 1936) indicate that the Panamanian identification was in error, and that the species is in reality confined to Colombia. Morphologically, there seems little reason why the Williams 707 specimen cannot be considered as *C. Pittieri*, and it is so listed here.

8. *CALLIANDRA CONFUSA* Sprague & Riley in Kew Bull. Misc. Inf. 1923:371. 1923.

Calliandra similis Sprague & Riley, loc. cit. 372. 1923.

Anneslia confusa Britt. & Rose, in N. Am. Fl. 23:70. 1928.

Anneslia similis Britt. & Rose, loc. cit. 71. 1928.

Small tree or shrub, the branchlets lightly hirsute to subglabrous, longitudinally striate. Leaves large, bipinnate, the pinnae 10-20 or more (usually about 15) pairs, opposite, the leaflets numerous (30-60, usually 40-50, pairs); petiole usually about 2 cm. long, pubescent to subglabrous, sulcate above, eglandular; rachis similar, 8-15 cm. long; pinnular rachis about 4 cm. long, ridged above, lightly pubescent; leaflets linear, usually about 5-6 mm. long and 1 mm. wide, acute or narrowly obtuse apically, obliquely truncate basally, glabrous above and below except appressed-ciliate on the margins, only the midvein prominent, this more or less central; stipules linear-lanceolate, 4-5 mm. long, glabrous, striate, caducous. Inflorescence a terminal raceme or panicle; peduncles mostly 5-8 mm. long, geminate or few-fasciculate, subglabrous; pedicels 2-4 mm. long; bracts lanceolate-caducous. Flowers in few-flowered umbels, purplish-red; calyx broadly campanulate, scarcely 2 mm. long, glabrous, 5-toothed, the teeth broad; corolla 5-lobed, cleft almost to the base, the lobes elliptic or oblong, 5-6 mm. long, glabrous, the tube about 1 mm. long; stamens as much as 6 cm. long, united below into a short staminal tube 2-3 mm. long; ovary glabrous. Legume almost 8 cm. long and about 1 cm. wide, strigose-pubescent, dehiscing as typical of the genus.

Panama to northern Central America and southern Mexico, northern South America?

CHIRIQUÍ: Boquete, Terry & Terry 1637; Woodson & Schery 757; R. Chiriquí Viejo, G. & P. White 112; Allen 4651.

This species is a member of the "Houstoniana complex" (HOUSTONIANAE of Britton and Rose) very common in Mexico and to a lesser extent in northern Central America. There are probably 3 or 4 tenable species in that area, of which *C. Houstoniana* dating from 1768 and *C. grandiflora* dating from 1788 are the best

Fig. 96. *Calliandra confusa*

known (*C. anomala* and *C. strigillosa* of the early 1800's may also be "good" species, but several additional "species" in this group, proposed by Britton and Rose and others, seem anything but clear-cut). The southern extension of this complex in Central America (Honduras to Panama) seems to be confined to the single species here listed. It is impossible to say without examining the type whether or not the earlier name, *C. calothyrsus* Meissn., for a South American specimen (collected in 1846 by Kegel in Surinam), can apply to the entity found in Panama.

In describing *C. confusa* and *C. similis*, Sprague and Riley seem to have hit upon two extremes of the same entity. Our cited specimens and others from Costa Rica to Guatemala appear to be quite intermediate between characteristics described for these names. Hence it has been necessary to regard *C. similis* as a synonym of *C. confusa*.

C. confusa is similar to *C. grandiflora*, but lacks the floral pubescence of that species. It is quite distinct from other species of *Calliandra* occurring in Panama, being the only species there having a terminal, racemose or paniculate type of inflorescence. The plant is very attractive because of the showy purplish-red flowers and fine foliage, and deserves attention as an ornamental.

6. ACACIA Willd.

ACACIA Willd. Sp. Pl. 4:1049. 1806.

Numerous synonyms occur for the genus. Segregate genera proposed by Rafinesque (*Sylva Tellur.* 118-120. 1838) include: *Cuparilla*, *Drepaphyla*, *Eburnax*, *Esclerona*, *Gumifera*, *Hecatandra*, *Poponax*, *Senegalia*, and *Zigmaloba*. Britton and Rose segregates (*N. Am. Fl.* 23:85-96. 1928) include: *Acaciella*, *Acaciopsis*, *Babamia*, *Fisblockia*, *Lucaya*, *Myrmecodendron*, *Tauroceras*, and *Feracacia* Britt. & Bro. Léon. Dalla Torre & Harms further list the following synonyms: *Artbosprion* Hassk.; *Cbitonanthus* Lehm.; *Farnesia* Gasparr.; *Hoopesia* Buckl.; *Phyllodoce* Link; *Sassa* Bruce ex Gmelin; *Tetracheilos* Lehm.; *Vachellia* Wight & Arn.

Woody plants, usually armed with scattered thorns or stipular spines. Leaves (Central American species) bipinnate, the pinnae few or many, opposite, the leaflets mostly small and numerous; petiole in the majority of species bearing some sort of a gland or glandular field; rachis short or elongate, glandular or less often eglandular; stipules usually small and caducous but sometimes modified as prominent spines, in the "bull-horn" species these very large and myrmecophilous. Inflorescence basically of axillary, solitary or fasciculate, pedunculate heads, spikes, umbels or racemes, often appearing paniculate because of suppression of leaves at terminal and subterminal, floriferous nodes. Flowers small, usually numerous and dense, predominately whitish or yellowish, normally exceeding the bractlets; calyx usually campanulate, sympetalous, 4- or 5-toothed; corolla typically funnellform, sympetalous for most of its length or in some species 4- to 5-cleft nearly to the base; stamens diagnostic, numerous, free or rarely somewhat united at the extreme base; anthers small, rarely glandular; ovary small, the style and terminal stigma scarcely visible among the stamens. Legume usually oblong to linear, terete or more frequently compressed or flattened, usually straight, dehiscent and with slightly elevated margins, the seeds transverse.

Tropics and subtropics of New and Old Worlds, very prominent in Australia.

The genus is highly variable, with many groups of species simulating diverse other genera (parallel evolution) and reflecting environmental adaptation (xerophytism, etc.). It is thus extremely difficult to give a generalized yet definitive description for the genus (the numerous, free or nearly free stamens being the only binding characteristic), but it is even more difficult to establish clear-cut subdivisions of or within the genus. Most of the numerous segregates of *Acacia*, such as those recognized by Britton and Rose (*N. Am. Fl.* 23:84. 1928), depend upon subjective evaluation (viz.: coriaceous vs. cartilaginous; linear vs. oblong; subterete vs. turgid; promptly vs. tardily dehiscent; etc.). It becomes highly inconvenient with these segregates to determine the "genus," let alone the species,

except where perfect material (with fruit) and at least modest familiarity with the group is to be had. Even then many marginal cases exist, where a species may well fall into either of two "genera." Thus, for convenience, if nothing else, I prefer to recognize *Acacia* in the traditional broad sense, in spite of certain groups of species forming islands within the genus markedly different from other groupings of species.

The species of *Acacia* usually present considerable variability and intergradation. It would seem that formulation of species has been unusually inordinate in this genus. When material from Mexico to middle South America is examined and compared, or in areas from which abundant material is available, many specific distinctions fade. This appears especially true in the segregate genera "*Acaciella*" and "*Senegalia*" as considered by Britton and Rose. On the other hand, many of the "bull-horn" species, differing but difficult of separation, may prove constant with further collections. Collections of all species in Panama are rather meagre, with the possible exception of species occurring on Barro Colorado Island. It is as yet not possible to study degree of variation of these species within the country, nor to confidently correlate single or few collections with better known Mexican and northern Central American expressions of (presumably) the same entity.

- a. Flowers pedicellate; petiole eglandular; twigs unarmed ("*Acaciella*").
 - b. Leaflets nearly linear (about 6 mm. long and 1 mm. wide), numerous (frequently 60 or more pairs per pinna), subglabrous; twigs commonly subglabrous..... 1. *A. ANGUSTISSIMA*
 - bb. Leaflets oblong or ovate (usually 8-9 mm. long and at least 2 mm. wide), fewer (9-25 pairs per pinna), pubescent; twigs often villous.... 2. *A. VILLOSA*
- 3a. Flowers sessile or subsessile; petiole with 1 or more glands; twigs rarely unarmed.
 - b. Armament of scattered thorns or lacking; flowers whitish ("*Senegalia*").
 - c. Flowers in short, oblong spikes, comparatively large..... 3. *A. HAYESII*
 - cc. Flowers capitate, small.
 - d. Leaflets relatively large (usually 10 mm. long), more or less oblong, pubescent at least below; thorns frequently lacking..... 4. *A. GLOMEROSA*
 - dd. Leaflets small (usually 4-6 mm. long), linear or sublinear, glabrous except often ciliate marginally; thorns usually present.
 - e. Costa of leaflet excentric, submarginal; petiolar gland usually solitary; legume glabrous or subglabrous in age..... 5. *A. TENUIFOLIA*
 - ee. Costa of leaflet subcentral, at least apically; petiole frequently bearing 2 glands; legume tomentulose..... 6. *A. RIPARIA*
 - bb. Armament of paired stipular spines; flowers yellowish.
 - c. Stipular spines slender, usually whitish, solid, not ant-infested; peduncle not involucrate; in *A. farnesiana* older branchlets with axillary "cushions" or short-shoots, and the leaves small (scarcely 6 cm. long), with few pinnae.
 - d. Leaves less than 6 cm. long, with 2-6 pairs of pinnae ("*Vacbellia*")..... 7. *A. FARNESIANA*
 - dd. Leaves usually 10 cm. long or longer, with 8-60 pairs of pinnae ("*Poponax*"). Not known from Panama outside of cultivation, but to be expected there..... 8. *A. MACRACANTHA*
 - cc. Stipular spines mostly gross, dark, hollow, myrmecophilous; peduncle involucrate; leaves large (usually 1 dm. long or longer), with several pinnae ("*Myrmecodendron*" except no. 12).
 - d. Inflorescence capitate; leaflets with a single prominent vein; leaf rachis glandular.
 - e. Heads axillary; petiole eglandular..... 9. *A. COOKII*

- ee. Inflorescence paniculate, the nodes not foliate; petiole bearing few to several glands..... 10. *A. MELANOCERAS*
- dd. Inflorescence spicate; leaflets with 2-3 prominent veins; leaf rachis usually eglandular.
- e. Legume turgid-compressed, dehiscent (often tardily), short-beaked, the pericarp thick; spike thin (about 3 mm. thick), without protruding bractlets; petiolar gland of 2-3 crateriform nectaries..... 11. *A. COSTARICENSIS*
- ee. Legume terete, indehiscent, long-beaked, the pericarp thin; spike stout (almost 1 cm. thick), with protruding bractlets; petiolar gland with a solitary, crateriform nectary ("Tauroceras"). To be expected in Panama..... 12. *A. SPADICIGERA*

1. *ACACIA ANGUSTISSIMA* (Mill.) Ktze. Rev. Gen. Pl. 3²:47. 1898.

Mimosa angustissima Mill. Gard. Dict. ed. 8, no. 19. 1768.

Mimosa filicioides Cav. Icon. Pl. 1:55, pl. 78. 1791.

Acacia filicina Willd. Sp. Pl. 4:1072. 1806.

Mimosa ptericina Poir. in Lam. Encycl. Meth. Suppl. 1:74. 1810.

Acacia glabrata Schlecht. in Linnaea 12:569. 1838.

Acacia angulosa Bertol. Fl. Guat. 42. 1840.

Acacia insignis Mart. & Gal. in Bull. Acad. Brux. 10²:315. 1843.

Acacia filicioides Trelease, Rept. Ark. Geol. Surv. 1888⁴:178. 1891.

Acacia boliviana Rusby, in Bull. N. Y. Bot. Gard. 4:348. 1907.

Acaciella angustissima Britt. & Rose, in N. Am. Fl. 23:100. 1928.

Acaciella angulosa Britt. & Rose, loc. cit. 100. 1928.

Acaciella costaricensis Britt. & Rose, loc. cit. 101. 1928.

Acaciella Rensonii Britt. & Rose, loc. cit. 101. 1928.

?*Acaciella Holtonii* Britt. & Killip, in Ann. N. Y. Acad. Sci. 35:140. 1936.

Acaciella martensis Britt. & Killip, loc. cit. 1936.

Acaciella santanderensis Britt. & Killip, loc. cit. 1936.

Acacia Pittieriana Standl. in Field Mus. Publ. Bot. 18:489. 1937.

Bentham (Trans. Linn. Soc. 30:532. 1875) further lists the following species as synonyms of *A. angustissima*: *A. chlorantha* Zucc., *A. cuspidata* Schlecht., *A. elegans* Mart. & Gal., *A. elegans* Schlecht., *A. Hartwegi* Benth., *A. hirsuta* Schlecht., *A. birta* Nutt., *A. penicillifera* Lag., *A. stipellata* Schlecht., *A. texensis* Torr., *A. umbellifera* Kunth.

Wiggins (Contr. Dudley Herb. 3:229-233. 1942) lists the following names as synonymous with several subspecies of *A. angustissima*: *Acacia Lemmonii* Rose, *A. birta* var. *Shrevei* and var. *suffrutescens* Kearney & Peebles, *A. suffrutescens* Rose; *Acaciella brevicaucosa* Britt. & Rose, *A. ciliata* Britt. & Rose, *A. birta* Britt. & Rose, *A. Lemmonii* Britt. & Rose, *A. salvadorensis* Britt. & Rose, *A. Shrevei* Britt. & Rose, *A. Smithii* Britt. & Rose, *A. suffrutescens* Britt. & Rose.

Shrub or tree, the branchlets pubescent or puberulent to subglabrous, not noticeably lenticellate, longitudinally striate or angled. Leaves moderately large, bipinnate, the pinnae few to several pairs (about 15 pairs in Panamanian material cited), opposite or subopposite on the rachis, the leaflets numerous (up to 60 or more pairs per pinna); petiole up to a few cm. long, puberulent, eglandular, sulcate above; rachis up to 12 or more cm. long, like the petiole; pinnular rachis 3-9 cm. long, somewhat margined, seemingly eglandular, bearing basally a pair of stipule-like leaflets; leaflets nearly linear, usually about 6 mm. long and 1 mm. wide, acute (mostly bluntly so) apically, obliquely truncate basally, glabrous except ciliate-margined, dull above and below but darker above, the costa visible but secondary venation obscure; stipules linear-subulate, mostly 4-6 mm. long. Inflorescence a terminal or subterminal panicle of pedunculate umbels (heads),

Fig. 97. *Acacia angustissima*

these solitary to few-fasciculate from the (usually) defoliate nodes; peduncles usually about 1 cm. long; floral bracts obovate-spatulate, little more than 1 mm. long; pedicels mostly 1–2 mm. long, borne from the terminus of the peduncle in umbellate or very short-spicate fashion. Flowers few to several per umbel, whitish; calyx campanulate or turbinate, about 1 mm. long, glabrous or sometimes sparingly ciliate, the teeth short and broad; corolla funnelform, about 2 mm. long, glabrous, the lobes divided almost to the base; stamens many, about 4 mm. long, free except at the extreme base; anthers eglandular; ovary scarcely stipitate, glabrous or minutely puberulent, the style slightly exceeding the stamens. Legume linear-oblong, 4–8 cm. long and about 1 cm. wide, flat and thin, stipitate, glabrous in age; the seeds few, transverse.

Mexico to middle South America.

CHIRIQUÍ: R. Chiriquí Viejo, *P. White* 35, 190.

After examining Panamanian and Central American material of this species, and further noting its complicated synonymy, I must agree with Standley and Steyermark (*Fieldiana: Bot.* 24⁵:5. 1946) that a not-unusually-variable species has been made difficult by extreme splitting. Exact specific delimitation must await

the monographer, but again I concur with Standley and Steyermark's findings for Guatemala, in that Panamanian material won't "work" in Wiggins' separation of *A. angustissima* from *A. filicioides*.

2. *ACACIA VILLOSA* (Sw.) Willd. Sp. Pl. 4:1067. 1806.

Mimosa villosa Sw. Fl. Ind. Occ. 2:982. 1800.

Acacia lophanthoides DC. Prodr. 2:457. 1825.

Acacia carbonaria Schlecht. in Linnaea 12:571. 1838, fide Benth.

Acacia Cumingii Benth. in Hook. Lond. Jour. Bot. 1:525. 1842, fide Benth.

Acacia Valenzuelana A. Rich. Ess. Fl. Cub. 1:462. 1845.

Acaciella villosa Britt. & Rose, in N. Am. Fl. 23:104. 1928.

Acaciella Cumingii Britt. & Rose, loc. cit. 1928.

?*Acaciella Oerstedii* Britt. & Rose, loc. cit. ex char. 1928.

Shrub up to a few m. tall, unarmed, the branchlets heavily pubescent to almost glabrous. Leaves moderately large, bipinnate, the pinnae 4-10 pairs opposite on the rachis, the leaflets 9-25 pairs per pinna; petiole mostly about 2 cm. long, pubescent, normally eglandular, sulcate above; rachis similar to the petiole, 2-8 cm. long; pinnular rachis about 4 cm. long, pubescent, usually eglandular; leaflets broadly oblong or ovate, mostly about 8 or 9 mm. long, more or less inequilaterally obtuse apically, obliquely rounded basally, subglabrous or lightly pubescent above, appressed-pilose below, obscurely pinnately veined; stipules linear-lanceolate, 2-3 mm. long. Inflorescence of axillary, pedunculate heads, usually appearing more or less panicle towards the tips of twigs because of insertion of peduncles at defoliate or immature foliate nodes; peduncles about 2 cm. long, pubescent; head compact, subglobose or very short-spicate, about 30-flowered. Flowers small, briefly pedicellate; calyx broadly cupulate, about 1 mm. long, shallowly 5-toothed, glabrous, sometimes ciliate; corolla funnelform-campanulate, 2-3 mm. long, glabrous except sometimes pubescent apically, deeply 5-parted; stamens numerous, about 5 mm. long. Legume oblong, 5-6 cm. long and almost 1 cm. wide, flat and thin, tapered basally, stipitate, lightly pubescent, the seeds transverse.

Southern Central America and West Indies.

According to Britton and Rose, this species is confined to Jamaica, while *A. Cumingii* is recognized as a distinct species known only from the Panamanian type. We have been unable to examine type material of either of these species, or, for that matter, of most of the synonyms listed. However, Bentham, author of *A. Cumingii*, with the accumulation of more material, later reduced his species to synonymy with *A. villosa* (Trans. Linn. Soc. 30:532. 1875). There seems to be no reason for not accepting Bentham's judgment, at least without reference to type material. Bentham's type sheet of *A. Cumingii* (*Cuming 1242*) thus becomes the record on which we base inclusion of *A. villosa* in Panama. No additional collections from there have come to our attention. Necessarily, the description above given is a composite from several sources and does not reflect any given specimen.

Acacia villosa somewhat resembles *A. angustissima*, but can be distinguished from it in having significantly broader and usually larger, more pubescent leaflets.

3. *ACACIA HAYESII* Benth. in Trans. Linn. Soc. 30:524. 1875.

Senegalia Hayesii Britt. & Rose, in N. Am. Fl. 23:114. 1928.

Senegalia acanthophylla Britt. & Rose, loc. cit. 117. 1928.

Acacia telensis Standl. in Field Mus. Publ. Bot. 4:308. 1929.

Acacia acanthophylla Standl. loc. cit. 18:488. 1937.

Liana or scandent shrub, armed with small, scattered, recurved thorns, the branchlets puberulent when young becoming glabrous. Leaves large, bipinnate, the pinnae usually about 10 pairs opposite on the rachis, the leaflets nearly 20 pairs per pinna; petiole 2 or more cm. long, puberulent above, bearing 1 or 2 cupulate, sessile glands; rachis up to 20 or more cm. long, similar to the petiole, bearing cupulate glands just below insertion of all or most pairs of pinnae; pinnular rachis 4-5 cm. long, presumably puberulent and with occasional small glands at the distal rachial nodes; leaflets linear-oblong, 8-10 mm. long, somewhat falcate, briefly mucronate apically, obliquely subtruncate basally, reportedly glabrous in a fragment of the type but appressed-pubescent below, the costa markedly excentric; stipules obovate? Inflorescence of 1 to few pedunculate spikes from subterminal, defoliate or minutely foliate nodes, thus appearing paniculate early; peduncles 1-2 cm. long, puberulent; spikes 10-12 mm. long, dense. Flowers subsessile, presumably whitish; calyx cupulate, about 2 mm. long and equally as broad, glabrous, moderately lobed; corolla cylindric-campanulate, about 4 mm. long, glabrous, rather briefly lobed; stamens many, 7-8 mm. long. Legume linear-oblong, flat, thin, stipitate, glabrous.

Panama, Costa Rica, Honduras.

CANAL ZONE: Mammee railroad station, *S. Hayes s. n.*

Examination of a photograph and a fragment of the type shows that specimens referable to the Honduran *A. telensis* and the Costa Rican *Senegalia acanthophylla* constitute a second record for *A. Hayesii*, previously known only from Panama.

4. *ACACIA GLOMEROSA* Benth. in Hook. Lond. Jour. Bot. 1:521. 1842.

Senegalia glomerosa Britt. & Rose, in N. Am. Fl. 23:116. 1928.

Usually a moderate to large tree, often buttressed, unarmed or sparingly armed with a scattering of recurved prickles on twigs and rachis, the branchlets pubescent when young becoming glabrous with age. Leaves quite large, bipinnate, the pinnae several to many pairs, the leaflets many (about 30) pairs per pinna; petiole 2-4 cm. long, tomentulose to subglabrous, flattened or sulcate above, bearing 1 (-2?) sessile gland usually below the middle; rachis up to 20 cm. long, similar to the petiole, sometimes aculeate below, usually bearing sessile glands above just below the distal few rachial nodes; pinnular rachis up to 10 cm. long, pubescent, glandular at the distal foliolar nodes; leaflets narrowly oblong or linear-oblong, mostly about 10 mm. long and 2-3 mm. wide, asymmetrically obtuse or acutish apically and thus subfalcate, obliquely truncate basally, puberulent or subglabrous above, appressed-pubescent below, the costa markedly excentric but not marginal, other

venation visible but obscure; stipules linear, caducous. Inflorescence a terminal panicle of pedunculate heads; peduncles 5–15 mm. long, tomentulose; heads compact, globose, 12- to 20-flowered, the bracts minute. Flowers small, cream or white; calyx cupulate, about 1 mm. long, puberulent; corolla funnelform, 2–3 mm. long, pubescent, the lobes about $\frac{1}{3}$ as long as the tube; stamens many, mostly 5–6 mm. long. Legume linear-oblong, up to 20 cm. long and 3 cm. wide, rounded-subcuneate apically and basally, flat, puberulent becoming subglabrous in age, the margins slightly elevated, the seeds few, transverse.

Mexico to middle South America.

CANAL ZONE: Barro Colorado Island, *Aviles 10b*.

This species is quite variable, and in its extended range exhibits a number of diverse forms. Apparently it is commonly found as an erect tree, but sometimes it assumes somewhat the aspect of a liana. Most specimens are unarmed, but not a few bear scattered, recurved prickles, nor is this characteristic always associated with the subscandent habit. The Panamanian specimen cited possesses a longer pubescence than is typical for the species either in South America or north of Panama. It is also "atypical" in being armed and having more than the usual number of pinnae. Yet it can probably be considered within the specific boundaries of *A. glomerosa* despite uncertainties and perhaps intermediacy towards *A. tenuifolia*. The plant is evidently uncommon in Panama.

Our specimen (and others passing as the species) could almost as well be called *A. polyphylla* DC. as *A. glomerosa*. In fact, considered over their entire range, it is doubtful that *A. glomerosa* can be maintained as a species distinct from the older *A. polyphylla*.

5. *ACACIA TENUIFOLIA* (L.) Willd. Sp. Pl. 4:1091. 1806.

Mimosa tenuifolia L. Sp. Pl. 523. 1753.

Acacia paniculata Willd. Sp. Pl. 4:1074. 1806.

Mimosa grandisiliqua Vell. Fl. Flum. Ic. 11:f. 37. 1827, fide Benth.

Acacia grandisiliqua Benth. in Hook. Lond. Jour. Bot. 1:518. 1842.

Acacia Claussenii Benth., loc. cit. 1842, fide Benth.

Acacia martinicensis Presl, Bot. Bemer. 65. 1844, fide Britt. & Rose.

Acacia microcephala A. Rich. Ess. Fl. Cub. 1:469. 1845, fide Britt. & Rose.

Senegalia tenuifolia Britt. & Rose, in N. Am. Fl. 23:118. 1928.

Tall liana, climbing through tops of trees, the branchlets puberulent or minutely tomentose, armed with broad-based, recurved thorns. Leaves large, bipinnate, the pinnae 20 or more pairs opposite on the rachis, leaflets numerous (about 70 pairs); petiole up to a few cm. long, terete, lightly tomentulose or puberulent, armed, bearing about 1 cm. from the base a sessile, longitudinally oblong gland; rachis about 20 cm. long, flattened or subsulcate and puberulent or tomentose above, armed with thorns, bearing at the uppermost several rachial nodes prominent orbicular glands; pinnular rachis about 7 cm. long, glabrous below, tomentose above, eglandular; leaflets asymmetrically linear, about 4 mm. long and less than 1 mm. wide, broadly and inequilaterally acute apically, obliquely truncate basally,

glabrous except ciliate-margined, the costa excentric, secondary veins prominent below but not above, dull; stipules caducous. Inflorescence paniculate, up to 3 or more dm. long, the primary axis armed, tomentulose; ultimate divisions of 1 to few pedunculate heads from nodes on which leaves have not yet developed; peduncles mostly 10–15 mm. long, tomentulose; heads several-flowered, globose, the floral bracts minute. Flowers dense, white; calyx funnelform-cupulate, about 1 mm. long, puberulent; corolla funnelform, scarcely 2 mm. long, minutely puberulent, deeply lobed; stamens many, 3–4 mm. long, glabrous, free except at the extreme base; anthers mostly eglandular (some apparently abortively glandular in bud); ovary pubescent, long-stipitate. Legume presumably linear-oblong, flat, thin, non-septate, glabrous in age.

Mexico to middle South America; West Indies.

DARIÉN: R. Chico, Allen 4646; El Real, Allen 961. SAN BLAS: Puerto Obaldía, Pittier 4326.

Britton and Rose (N. Am. Fl. 23) and various other authors have not recognized the synonymy of the South American *A. paniculata* and several Central American and Mexican "species" which probably represent the Linnean name *A. tenuifolia*. Yet a comparison of a series of Mexican, Central American, and West Indian specimens with South American material shows remarkably little difference. I have thus accepted Bentham's judgment that *A. paniculata* and *A. tenuifolia* are the same, and constitute merely one, not overly variable, species.

6. *ACACIA RIPARIA* HBK. Nov. Gen. & Sp. 6:276. 1824.

?*Mimosa retusa* Jacq. Enum. Pl. Carib. 34. 1762, fide Ind. Kew.

Mimosa paniculata West, Bidr. til Beskr. Ste.-Croix, 312. 1793; non authors, fide Ind. Kew.

Acacia Westiana DC. Prodr. 2:464. 1825, fide Benth.

Acacia guadalupensis DC. loc. cit. 1825.

?*Mimosa plana* Vell. Fl. Flum. Ic. 11:t. 28. 1827, fide Benth.

Acacia quadriglandulosa Mart. in Flora 20, Beibl. 2:110. 1838, fide Ind. Kew.

Acacia tubulifera Benth. in Hook. Lond. Jour. Bot. 1:520. 1842, fide Macbride.

Acacia sarmentosa Griseb. Fl. Brit. W. Ind. 221. 1861; non Desf., fide Ind. Kew.

Senegalia riparia Britt. & Rose, in Ann. N. Y. Acad. Sci. 35:144. 1936.

Shrub or tree (or often subscandent), sparingly aculeate on leaf rachis and twigs, with small, scattered, recurved thorns, the branchlets puberulent soon becoming glabrous, striate. Leaves moderately large, bipinnate, the pinnae 6–20 pairs opposite on the rachis, the leaflets many (mostly 20–40) pairs per pinna; petiole about 2 cm. long, sulcate above, subglabrous, bearing on the upper side 1 or more (usually 2) sessile, patelliform, longitudinally oblong glands; rachis up to 15 cm. long, sulcate and puberulent above, bearing glands like those of the petiole just below the several distal rachial nodes; pinnae usually 4–5 cm. long, eglandular; leaflets linear-oblong, 3–7 (usually 4–5) mm. long and about 1 mm. wide, more or less rounded to broadly acute apically, obliquely rounded or subtruncate basally, glabrous above and below, usually ciliate marginally and barbate at the base on the inner margin below, the costa subcentral except at the inequilateral base, it and a

few remote lateral veins prominent below, dull; stipules caducous or lacking. Inflorescence seemingly a raceme or panicle of pedunculate heads, these 1- to few-fasciculate from subterminal defoliate or tardily foliate nodes (nodes foliate in age or with fruit); peduncle 1-2 cm. long at anthesis, tomentulose; head dense, subglobose, about 30-flowered. Flowers sessile, whitish; calyx cupular, 1 mm. long, puberulent; corolla funnelform, 3-4 mm. long, puberulent apically, the lobes brief; stamens many, free, about 6 mm. long. Legume linear-oblong, usually 10-15 cm. long and 20-25 mm. wide, stipitate, tomentulose, usually sharp-beaked apically, flat and thin, the margins slightly elevated, the seeds transverse.

Middle South America to southern Central America; perhaps northern Central America and southern Mexico?

CANAL ZONE: Barro Colorado Island, *Aviles* 14; *Brown* 148; *Shattuck* 436; *Wetmore* & *Abbe* 205; *Woodworth* & *Vestal* 512. CHIRIQUI: San Felix, *Pittier* 5141.

Possibly the name *Acacia retusa* should apply to this species, but inasmuch as none of the types are available and Bentham himself had only "ex char." acquaintanceship with *Mimosa retusa* Jacq., which he listed as synonymous, we do not suggest any change in the familiar name, *A. riparia*. The species seems to grade into what commonly passes for *A. riparioides* in northern Central America and Mexico, differing from it primarily in having a somewhat longer corolla. The Chiriquí specimen is somewhat atypical, having larger flowers approaching those of *A. Hayesii*.

7. *ACACIA FARNESIANA* (L.) Willd. Sp. Pl. 4:1083. 1806.

Mimosa farnesiana L. Sp. Pl. 521. 1753.

Acacia acicularis Willd. Enum. 1056. 1809.

Vachellia farnesiana Wight & Arn. Prodr. Fl. Penins. Ind. Or. 272. 1834.

Listed by Bentham (Trans. Linn. Soc. 30:502. 1875) as additional synonyms are: *Acacia edulis* H. & B., *A. lenticellata* F. Muell., *A. leptophylla* DC., *A. pedunculata* Willd., *Farnesia odora* Gaspar., *Mimosa pedunculata* Poir., *M. scorpioides* Forsk.

Shrubs or occasionally small trees, the branchlets frequently somewhat pilose when young becoming glabrous, prominently lenticellate, armed with slender, solid (but having a soft pith), whitish, stipular spines up to about 3 cm. long, these not ant-infested. Leaves moderately small, bipinnate, the pinnae 2-6 pairs opposite on the rachis, the leaflets mostly 10-20 pairs per pinna; petiole up to 1 cm. long, terete except somewhat flattened above, usually tomentulose-subhirsute, bearing a sessile, oblong gland above the middle; rachis 1-5 cm. long, similar to the petiole, usually bearing a gland at insertion of the terminal pair of pinnae; pinnular rachis 1-3 cm. long, flattened above, often bearing a minute gland just below insertion of the terminal pair of leaflets; leaflets narrowly oblong, about 4 mm. long and 1 mm. wide, rounded apically, obliquely rounded or truncate basally, glabrous except frequently ciliate marginally, the costa prominent but other venation usually obscure. Inflorescence of axillary, pedunculate heads, these 1 to few from foliate nodes; peduncles mostly 1-2.5 cm. long, pubescent; heads dense,

globular; floral bracts narrowly oblanceolate, tipped white-pilose. Flowers small, yellow, sessile, fragrant; calyx funnelform-cupulate, about 1 mm. long, glabrous except on the shallow teeth; corolla narrowly funnelform, about 2 mm. long, glabrous except on tips of the lobes, the lobes relatively short; stamens many, little more than 3 mm. long, free except at the extreme base. Legume linear-oblongoid, up to 6 or 7 cm. long and almost 1 cm. wide, turgid-subterete, glabrous, longitudinally confluent-striate, tardily dehiscent, coriaceous, with a sweet pulp, pithy in age, septate, the seeds transverse.

Southern United States and Mexico to Argentina; West Indies; introduced into many parts of the Old World.

CANAL ZONE: Balboa, *Standley* 30841; Las Cruces Trail, *Hunter & Allen* 682; *Pittier* 2621. COCLÉ: Penonomé, *Williams* 136. PANAMÁ: R. Jagua, *Hunter & Allen* 479; Juan Díaz, *Standley* 30535; Nuevo San Francisco, *Standley* 30703.

This abundant species is of some economic importance. Leaves and pods serve as food for stock, while the heavy wood is used for fuel. The bark and legume are a source of tannin. An exudate from the trunk is reported useful as a mucilage. In southern France especially the species has been extensively cultivated for the perfume industry.

Acacia farnesiana is not clearly distinct from what commonly passes as another Linnean species in Central and northern South America, *A. tortuosa*. Without access to authentic material of these two species, no attempt is made to pass judgment on them. The pod of *A. tortuosa* is typically pubescent, while that of *A. farnesiana* is glabrous and shorter. Yet intermediacy in this character is found, as well as in other characteristics which are quite different in their extremes. The unsnarling of these few related species will require more critical study than is possible in this Flora.

8. *ACACIA MACRACANTHA* Humb. & Bonpl. ex Willd. Sp. Pl. 4:1080. 1806.

Acacia macracanthoides Bert. in DC. Prodr. 2:463. 1825.

Poponax macracanthoides Britt. & Rose, in N. Am. Fl. 23:89. 1928.

For multitudinous additional synonyms see Benth. Trans. Linn. Soc. 30:500. 1875.

Small tree, the branchlets armed with small to large, solid, paired stipular spines, in youth pubescent to subglabrous, later subglabrous and prominently lenticellate. Leaves moderately large, bipinnate, the pinnae 8- (reportedly) 60 pairs opposite on the rachis, the leaflets many. Petiole about 1 cm. long, pubescent, canaliculate above, bearing a longitudinally extended, crateriform gland slightly above the middle; rachis similar, gland-bearing only at terminal 1 to few rachial nodes; pinnae 2-3 cm. long, eglandular; leaflets linear or linear-oblong, mostly about 3 mm. long and scarcely 1 mm. wide, rounded or obtuse apically, obliquely rounded to subtruncate basally, glabrous or lightly pubescent, only the costa prominent; stipules modified as spines. Inflorescence of axillary, pedunculate heads, solitary or few-fasciculate; peduncles about 1 cm. long, tomentose, ebracteate (except at head); head orbicular, dense, less than 1 cm. in diameter; floral bracts linear-

spatulate, about 1 mm. long. Flowers small; calyx funnelform, about 1 mm. long, tomentulose apically; corolla tubular-funnelform, about 2 mm. long, glabrous except on the prominent lobes; stamens many, free, about 3 mm. long. Legume variable, linear, reported up to 10 cm. long and 12 mm. wide, subterete, straight or somewhat curved, usually puberulent and glandular.

Northern South America and West Indies; in a broad sense, possibly also northern Central America.

CANAL ZONE: Summit, *Lindsay 249* (presumably cultivated: at Canal Zone Experiment Gardens).

This very variable species is evidently not known in the wild from Panama, but occurs in Colombia and other portions of northern South America and the West Indies. It somewhat resembles *A. farnesiana*, these two species alone (in Panama) possessing solid stipular spines. *A. macracantha* is readily distinguished from *A. farnesiana* by the larger, multi-pinnular leaves.

9. *ACACIA COOKII* Safford, in *Science* n. s. 31:677. 1910.

Acacia bucerophora B. L. Robins., in *Proc. Am. Acad.* 49:502. 1913.
Myrmecodendron Cookii Britt. & Rose, in *N. Am. Fl.* 23:93. 1928.

Shrub or tree, the branchlets puberulent soon becoming glabrous and heavily lenticellate, armed with paired stipular spines, many of these becoming very large, blackish, hollow, ant-infested. Leaves large, bipinnate, the pinnae about 15 pairs, the leaflets about 30 pairs per pinna; petiole short, puberulent at least above, eglandular, sulcate above; rachis 8–15 cm. long, similar to the petiole, bearing cupulate glands just below insertion of all or most pairs of pinnae; pinnular rachis about 3 cm. long, tomentulose, eglandular; leaflets essentially linear, in the Panamanian specimen 3–4 mm. long and less than 1 mm. wide (usually about 6 mm. long for the species), asymmetric and bluntly acute apically, obliquely truncate basally, glabrous except ciliate-margined, the venation obscure; stipules modified as spines, these when enlarged (ant-infested) briefly connate at the base and resembling bull horns. Inflorescence of axillary pedunculate heads; peduncles short, clustered, bearing a 3-parted involucre near the middle; head very compact, globose. Flowers small, yellowish; calyx cupular, about 1 mm. long, glabrous; corolla funnelform, barely exceeding the calyx, glabrous except puberulent on tips of the lobes; stamens numerous, about 2 mm. long. Legume reported linear, 10–30 cm. long, somewhat compressed, usually curved, subglabrous, sessile, beaked apically, 2-valvate.

Guatemala, British Honduras, Honduras; on basis of cited specimen, Panama.

BOCAS DEL TORO: Changuinola Valley, *Dunlap 462*.

The Panama specimen cited is very poor, and its determination cannot be entirely certain. It appears to match (descriptions and specimens of) *A. Cookii* better than *A. melanoceras*, the only other described species it might likely be. Our description is of the Panama plant insofar as possible (vegetative characters). The species is a member of the distinctive "bull-horn" group of *Acacias*.

10. *ACACIA MELANOCERAS* Beurl. in Sv. Vet. Akad. Handl. 1854:123. 1856.

Acacia multiglandulosa Schenck, in Fedde Rep. Sp. Nov. 12:362. 1913, fide Britt. & Rose.
Myrmecodendron melanoceras Britt. & Rose, in N. Am. Fl. 23:93. 1928.

Shrub or sometimes small tree, the branchlets puberulent when young, armed with large, terete, hollow, myrmecophilous, stipular spines, these briefly connate at the base and resembling bull horns. Leaves large, bipinnate, the pinnae normally at least 15 pairs, the leaflets 15-30 pairs per pinna; petiole 1-2 cm. long, sulcate above, usually puberulent, bearing on the upper side a number of conic glands in one or more rows; rachis similar, as much as 4 dm. long, bearing a conic gland just below insertion of most pairs of pinnae; pinnular rachis mostly 4-5 cm. long, if glandular obscurely so; leaflets linear, about 5-6 mm. long and scarcely more than 1 mm. wide, inequilaterally obtuse apically, obliquely rounded basally, glabrous, dull, with a single prominent vein; stipules modified as large, lustrous, brown or black spines as much as 4 or 5 cm. long. Inflorescence a terminal, raceme-like grouping of pedunculate heads, these 1 to few from the axils of defoliate or minutely foliate nodes; peduncles short, 2-12 mm. long, bearing near the base a 3- to 4-partite involucre; heads globular, densely flowered, the floral bracts peltate, about equalling the flowers. Flowers minute, yellow; calyx cupular, about 1 mm. long, glabrous or puberulent apically, obscurely lobed; corolla funnellform, little more than 1 mm. long, puberulent apically, more prominently lobed; stamens many, 2-3 mm. long. Legume linear-oblong, up to 10 cm. long, slightly compressed-subterete, short-beaked, longitudinally striate, glabrous, tardily dehiscent.

Panama.

CANAL ZONE: Barro Colorado Island, *Aviles 20b*; *Kenoyer 373*; France Field, *Fairchild Aug. 1924*; *Shropshire, Feb. 1945*.

The species is known only from Panama (types = *Billberg 289, 1825*, from Portobello, Colón). Possibly one or two species of northern Central America, such as *A. Donnelliana*, *A. Cookii* and *A. globulifera*, may prove to be the same entity; but insufficient collections are available to pass judgment on this question.

11. *ACACIA COSTARICENSIS* Schenck, in Fedde Rep. Sp. Nov. 12:361. 1913.

Acacia panamensis Schenck, loc. cit. 362. 1913, fide Britt. & Rose.

Acacia penonomensis Safford, in Jour. Wash. Acad. 4:363. 1914, fide Britt. & Rose.

Acacia Nelsonii Safford, loc. cit. 1914, fide Britt. & Rose.

Myrmecodendron costaricense Britt. & Rose, in N. Am. Fl. 23:93. 1928.

Shrub or small tree, the branchlets glabrous and laxly lenticellate, armed with large, hollow, myrmecophilous stipular spines shaped like the horns of a bull. Leaves large, bipinnate, the pinnae 4-12 pairs opposite on the rachis, the leaflets 13-24 pairs; petiole almost 2 cm. long, glabrous, flattened or sulcate above, bearing on the upper side below the middle usually 2-3 conic glands; rachis up to 15 cm. long, similar to the petiole, usually eglandular; pinnae somewhat lax, glabrous, eglandular, the axis margined; leaflets linear, usually 8-9 mm. long and only slightly more than 1 mm. wide, inequilaterally rounded or obtuse apically, obliquely

Fig. 98. *Acacia costaricensis*

rounded basally, glabrous and dull above and below, with 2-3 prominent palmate veins from the base; stipules large, terete spines frequently 3-4 cm. long, those of a pair fused at the base, lustrous, brownish. Inflorescence of condensed, pedunculate, axillary spikes about 3 or 4 cm. long; peduncle usually about 1 cm. long, bearing a tripartite involucre near the base; floriferous portion elongate, ament-like, becoming thicker in fruit; bractlets peltate, equalling the flowers. Flowers minute, very dense on the spike, yellowish; calyx cupulate, less than 1 mm. long, glabrous (or minutely puberulent marginally), obscurely lobed; corolla funnel-form, little more than 1 mm. long; stamens many, about 2 mm. long. Legume narrowly oblong, mostly 4-5 cm. long, bluntly and briefly beaked apically, sessile, slightly compressed-subterete, glabrous but more or less scurfy, longitudinally striate, pulpy, reportedly 2-valvate but apparently tardily dehiscent, the seeds obliquely longitudinal.

Mexico to Colombia.

CANAL ZONE: Chivi-Chivi trail, Maxon & Harvey 6579; Miraflores, Allen 1743. CHIRIQUI: Puerto Remedios, Pittier 3378. COCLÉ: Penonomé, Williams 113 (photo). PANAMÁ: R. Abajo, Bro. Paul 267; Bella Vista, Pittier 6785; Standley 25374; Macbride 2758; Nuevo San Francisco, Standley 30737.

This species, a member of the interesting "bull-horn" group very prominent in northern Central America and Mexico, runs into *A. Collinsii* (= *A. yucatanensis*) and possibly *A. birtipes* and *A. Hindsii* of that region. Three or four species of

Acacia in Panama have the large, hollow, ant-infested stipular thorns the basis for such popular names as "cockspur," *casa de hormigas*, *cornizuelo*, etc. Of these *A. costaricensis* can be readily distinguished by the spicate inflorescence.

12. *ACACIA SPADICIGERA* Schlecht. & Cham. in *Linnaea* 5:594. 1830.

Acacia nicoyensis Schenck, in Fedde Rep. Sp. Nov. 12:360. 1913.

Acacia cubensis Schenck, loc. cit. 1913, fide Britt. & Rose.

Acacia furcella Safford, in Jour. Wash. Acad. 4:359. 1914, fide Britt. & Rose.

Acacia Hernandezii Safford, loc. cit. 358. 1914, fide Britt. & Rose.

Tauroceras spadicigerum Britt. & Rose, in N. Am. Fl. 23:85. 1928.

Shrub or small tree, the branchlets glabrous, armed with large, hollow, grayish, paired, myrmecophilous stipular spines connate at the base and resembling bull horns. Leaves moderate, bipinnate, the pinnae mostly 2-8 pairs, the leaflets many (12-30 or more) pairs per pinna; petiole about 1 cm. long, glabrous, expanded above into a large, longitudinally oblong, glandular area bearing a solitary, extended conic "nectary"; rachis a few cm. long, glabrous, sulcate above, sometimes bearing an orbicular gland at insertion of the lowermost pair of pinnae; pinnae up to 7 cm. long, glabrous; leaflets linear, 5-10 mm. long and almost 2 mm. wide, rounded-mucronulate apically, obliquely truncate basally, glabrous, both costa and secondary veins noticeable; stipules modified as large, myrmecophilous spines as much as 8 cm. long. Inflorescence of axillary, pedunculate spikes; peduncles very short, usually about 3 mm. long, glabrous, bearing below the middle a 4-partite involucre; spikes oblong, mostly about 3 cm. long and almost 1 cm. wide, gross, spadix-like, the tips of the bractlets protruding. Flowers very small, very condensed, presumably yellow; calyx tubular-truncate, about 1 mm. long, glabrous; corolla included within calyx; stamens scarcely 2 mm. long. Legume oblong, about 8 cm. long (including beak) and about 13 mm. in diam., stipitate, long-beaked (the beak about 3 cm. long), terete, indehiscent, pulpy, the pericarp thin, the seeds transverse.

Mexico, northern Central America, Costa Rica; Panama?

This species is reported by modern authors from Costa Rica but not from Panama. Benthams incorrectly listed *Cuming 1270* from Panama as *A. spadicigera* (Trans. Linn. Soc. 30:514), the specimen actually being *A. costaricensis*. Nevertheless, there remains a distinct possibility that the species does occur and will eventually be collected in Panama. As with a number of pulpy legumes, the fruit of this species is commonly eaten by local peoples in Central America.

SPECIES DOUBTFULLY RECORDED FROM PANAMA

Acacia Hindsii Benth. (Hook. Lond. Jour. Bot. 1:504. 1842) has been reported from Panama, apparently in error. A specimen so determined in the herbarium of the Chicago Museum of Natural History proved to be *A. costaricensis*, and no additional collections from Panama of *A. Hindsii* have come to my attention in

any of the larger United States herbaria. This species is characterized by having the legume reputedly dehiscent only along the lower suture, being the only species among the "bull-horn" Acacias having this characteristic.

7. MIMOSA L.

MIMOSA L. Sp. Pl. 516. 1753.

?*Pantlocarpa* Raf. Neogen. 2. 1825, fide Dalla Torre & Harms.

Eburnax Raf. New Fl. N. Amer. 1:42. 1836, in part.

Lomoplis Raf. Sylva Tell. 118. 1838.

Sensitiva Raf. loc. cit. 119. 1838.

Pteromimosa Britt., in N. Am. Fl. 23:171. 1928.

Neomimosa Britt. & Rose, loc. cit. 172. 1928.

Mimosopsis Britt. & Rose, loc. cit. 174. 1928.

Acanthopteron Britt., loc. cit. 179. 1928.

Haitimimosa Britt., loc. cit. 179. 1928.

Coarse herbs or shrubs (in Panama), usually sprawling, decumbent to subscandent, heavily or lightly armed (in all Panamanian species except sometimes *M. pusilla*) with recurved thorns, variously pubescent. Leaves often sensitive (responding visibly to touch or other stimuli), bipinnate, the pinnae 1 to many pairs, opposite, the leaflets 2 to many pairs per pinna; petioles pulvinate, eglandular (in Panama), usually aculeate; rachis eglandular but often spinose- or subulate-appendaged; pinnae usually short, pulvinate, the pulvinus commonly setose; leaflets large and few or more commonly small and many, inequilateral basally, if pubescent usually strigose; stipules narrow, subpersistent. Inflorescence of pedunculate heads (in all Panamanian species) or spikes, these axillary from lower foliate and/or subterminal non-foliate nodes; floral bractlets usually shorter than the corolla, subpersistent. Flowers pinkish or whitish, normally sessile, small, numerous, usually perfect; calyx commonly very minute; corolla several times exceeding the calyx, usually funnelform, 3-6 (mostly 4) -lobed, the lobes equalling or shorter than the tube, valvate; stamens as many as or twice as many as the corolla lobes, free, exserted, the small anthers eglandular; ovary generally short, few- to many-ovulate, the style about equalling the stamens, the stigma not expanded. Legume linear to broadly oblong, flat, thin, with persistent margins, usually (as with all Panamanian species) transversely articulate, commonly setose-spinose.

Primarily western hemisphere from United States to Argentina, especially abundant in tropics and subtropics; a few species are known from Africa and Asia.

On the whole, the genus presents a rather natural grouping, grading, however, into certain (generally recognized) segregates such as *Schrankia*. Many of the species of *Mimosa* seem constantly distinctive, while others have evolved into a number of indistinct forms which are usually graced with (doubtfully tenable) specific names. As a result considerable condensation is in order, a common condition among most genera of the MIMOSOIDEAE.

In addition to Bentham's original classical work on the Leguminosae, B. L. Robinson presented a "Revision of the North American and Mexican species of

Mimosa" (Proc. Am. Acad. 33:305. 1898). Britton and Rose in the 'North American Flora' list about 150 species of *Mimosa* north of South America, of which 9 have been collected in Panama. A number of additional species are known from neighboring regions, some of which well may be collected in Panama eventually. Listed from Costa Rica are: *M. albida*, *M. Calderoni*, *M. dormiens*, *M. flavescens*, and *M. Watsonii*. Listed from Colombia by Britton and Killip (Ann. N. Y. Acad. Sci. 35:148-154. 1936) are: *M. albida*, *M. Andreana*, *M. colombiana*, *M. debilis*, *M. dormiens*, *M. esmeraldae*, *M. flavescens*, *M. floribunda*, *M. jiramenensis*, *M. Killipii*, *M. Lawranceana*, *M. leiocarpa*, *M. Martensis*, *M. oligacantha*, *M. polycarpa*, *M. quitensis*, *M. santanderensis*, *M. spiciflora*, *M. tenuiflora*, and *M. Trianae*, a number of them recognized species of long standing.

- a. Pinnae a single pair per leaf.
 - b. Leaflets 10-40 mm. long, 4-15 mm. wide, 2-6 pairs per pinna; legume 4-12 mm. wide.
 - c. Leaflets only 2 pairs per pinna, mostly 3-4 cm. long.
 - d. Leaflets 10-15 mm. wide, ovate to elliptic (broadest below the middle); legume mostly 6-10 mm. wide; head more robust.
 - e. Twigs glabrous or nearly so, copiously armed; leaflets sparingly if at all strigose; floral bractlets prominent, exceeding and obscuring the subglabrous buds..... 1. *M. VELLOZIANA*
 - ee. Twigs usually pubescent, sparingly aculeate; leaflets densely strigose; floral bractlets no longer than and scarcely visible among the puberulent buds..... 2. *M. ALBIDA*
 - dd. Leaflets mostly 4-10 mm. wide, more or less obovate (broadest above the middle); legume about 4 mm. wide; head less robust.. 3. *M. PANAMENSIS*
 - cc. Leaflets 3 or more pairs per pinna, mostly 1-3 cm. long..... 4. *M. CASTA*
 - bb. Leaflets 3-12 mm. long, 1-2 mm. wide, about 16 pairs per pinna; legume about 4 mm. wide..... 5. *M. PUDICA*
- aa. Pinnae 2 or more pairs per leaf, at least on some or most leaves.
 - b. Rachis very condensed or obsolete, the pinnae thus subdigitate; stamens as many as the corolla lobes.
 - c. Pinnae no more than 2 pairs; peduncle about 2 cm. long in maturity..... 5. *M. PUDICA*
 - cc. Pinnae 3-5 pairs; peduncles short, about 1 cm. long..... 6. *M. POLYDACTYLA*
 - bb. Rachis approximating or exceeding the petiole, the pinnae comparatively remote and quite obviously not subdigitate; stamens twice as many as the corolla lobes.
 - c. Slender plants, with shorter thorns and softer pubescence; leaflets with 1 main vein or costa; pinnae usually 2-5 (1-8) pairs; rachis approximating the petiole, setiform-appendaged.
 - d. Corolla membranous, not striate; pubescence not glandular; twigs strongly angled or terete.
 - e. Twigs terete or nearly so, scarcely if at all aculeate; pinnae 1-3 pairs; secondary veins of leaflet conspicuous; heads somewhat obconic, conspicuously bracteate..... 7. *M. PUSILLA*
 - ee. Twigs strongly angled or tetragonal, heavily aculeate; pinnae usually 4-5 pairs; secondary veins of leaflet obscure; heads nearly orbicular, inconspicuously bracteate..... 8. *M. INVISA*
 - dd. Corolla striate; pubescence almost always glandular-tipped; twigs subterete..... 9. *M. SOMNIANS*
 - cc. Coarse plant, formidably armed and setose-hispid; leaflets longitudinally few-veined; pinnae usually at least 10 pairs; rachis much exceeding the petiole, spinose at insertion of the pinnae..... 10. *M. PIGRA*

1. *MIMOSA VELLOZIANA* Mart. Herb. Fl. Bras. 185. 1837.

Mimosa viva Vell. Fl. Flum. Ic. 11:t. 33. 1827, not L.

Woody, vine-like shrub, scandent or decumbent, large or small, the branchlets subterete, glabrous or subglabrous, copiously armed with recurved thorns. Leaves reportedly sensitive, moderate, bipinnate, the pinnae a single pair, the leaflets only 2 pairs per pinna; petiole up to 5 or 6 cm. long, subglabrous, eglandular, armed with recurved thorns, conspicuously pulvinate basally, apiculate terminally; pinnular axis 1-2 cm. long, appendaged above the pulvinus, scarcely if at all aculeate; leaflets asymmetrically ovate-lanceolate, mostly 3-4 cm. long and 10-15 mm. wide, the inner member of the lower pair very reduced, acute-subacuminate apically, obliquely rounded basally, glabrous and darker above, sparingly setose-strigose or subglabrous and lighter below, setose-ciliate on the margins; stipules ovate, about 3 mm. long, ciliate. Inflorescence of axillary, pedunculate heads, often few-fasciculate; peduncles mostly 1-2 cm. long, unarmed, subglabrous; heads ovoid, compact, multiflorate; floral bractlets linear-lanceolate or linear-oblong, setose-fimbriate, about 2 mm. long. Flowers small, sessile, reportedly pinkish; calyx exceedingly minute, fimbriate-lobed; corolla funnelform, about 2 mm. long, subglabrous, the 4 lobes less than $\frac{1}{2}$ the length of the tube; stamens 4, 7-8 mm. long, the anthers orbicular; ovary setose. Legume oblong, 1-3 cm. long and 8-10 mm. wide, flat, segmented, densely setose-spinose on the persistent margins but little if at all so on the segments, otherwise glabrous.

Southern Mexico through Central and South America to Paraguay.

BOCAS DEL TORO: Changuinola Valley, *Dunlap* 293. CANAL ZONE: "Chagres", *Fendler* 91; "Panama", *Seemann* 100.

The species usually occurs in clearings, and fast becomes a pest, forming nearly impenetrable tangles which tear clothing and flesh. It is reported sensitive to touch, contracting the leaves when disturbed.

Mimosa Velloziana has consistently been regarded as a distinct and tenable species, in spite of the fact that it does not always exhibit hard and fast demarcation from certain species of greater antiquity. Remarkably like it, but usually without prominent, appressed, pectinate floral bractlets are *M. sensitiva* L. of Brazil (usually exhibiting markedly greater pubescence of twig, leaf and legume); *M. albida* H. & B. ex Willd. of the same general range (also more pubescent); *M. floribunda* Willd. = *M. strigosa* Willd. (which, according to Britton and Rose, are synonyms of *M. albida*); and five or six more recent species. Benthams states (Trans. Linn. Soc. 30:390. 1875): "[*M. sensitiva*, *M. Velloziana*] and the three or four following species [which include *M. albida*] pass so nearly one into the other that they would probably all have been included by Linnaeus under his *M. sensitiva*." Benthams likewise included *M. jiramenensis* Karst. of Colombia as but a variety of *M. Velloziana*, but Britton and Killip (Ann. N. Y. Acad. Sci. 35:150. 1936) recognize it as a distinct species.

2. *MIMOSA ALBIDA* Humb. & Bonpl. ex Willd. Sp. Pl. 4:1030. 1806.*Mimosa strigosa* Willd. Sp. Pl. 4:1030. 1806, fide Britt. & Rose.*Mimosa floribunda* Willd. loc. cit. 1031. 1806, not Vent., fide Britt. & Rose.*Mimosa Willdenowii* Poir. in Lam. Encycl. Meth. Suppl. 1:50. 1810.*Mimosa racemosa* Schlecht. in Linnaea 12:557. 1838, fide Britt. & Rose.*Mimosa albida* var. *floribunda* B. L. Robins. in Proc. Am. Acad. 33:311. 1898, fide Britt. & Rose.*Mimosa albida* var. *strigosa* B. L. Robins. loc. cit., fide Britt. & Rose.*Mimosa albida* var. *euryphylla* B. L. Robins. loc. cit., fide Britt. & Rose.*Mimosa albida* var. *glabrior* B. L. Robins. loc. cit., fide Britt. & Rose.*Mimosa Williamsii* Standl. in Contr. U. S. Nat. Herb. 18:105. 1916, not Rusby.*Mimosa Standleyi* Macbride, in Contr. Gray Herb. 59:12. 1919.

Usually a slender vine with trailing or clambering stems; branchlets terete, glabrous or more commonly (Panama) strigose or lightly tomentose, unarmed or

Fig. 99. *Mimosa albida*

sparingly aculeate (Panama). Leaves moderate, bipinnate, the pinnae a single pair, the leaflets only 2 pairs per pinna; petiole up to 5 or 6 cm. long, eglandular, pubescent like the branchlets, sometimes aculeate, apiculate terminally; pinnular axis 1-2 cm. long, appendaged above the pulvinus, usually pubescent; leaflets usually asymmetrically oblong or elliptic, broadly acute or obtuse and briefly mucronate apically, obliquely rounded basally, the costa strongly excentric, strigose-pubescent above and more heavily so below; stipules linear to linear-lanceolate, 3-4 mm. long, rigid, erect, pectinate-ciliate. Inflorescence of axillary, pedunculate heads, sometimes few-fasciculate; peduncles mostly 1-2 cm. long; heads ovoid, compact, multiflorate; floral bractlets sublinear, with subulate tips, scarcely equaling the corolla. Flowers small, sessile, whitish; calyx campanulate, minute; corolla funnelform, about 2 mm. long, usually 4-lobed, not striate, usually tomentulose apically in bud; stamens 4 (5?), mostly 4-6 mm. long, glabrous; ovary glabrous or subglabrous. Legume more or less oblong, 1-3 cm. long and usually 6-7 mm. wide, flat, 1- to few-segmented, short-stipitate or sessile, acute and subulate apically, setose-strigose or setose-spinose marginally.

Mexico to northern South America.

COCLÉ: Penonomé, Williams 101.

The cited specimen is the type collection for *M. Williamsii* Standl. (= *M. Standleyi*). It appears to be another of the aberrant forms commonly found in *M. albida*, a species known to vary extravagantly. Standley himself, with the original description of *M. Williamsii*, stated his species to be closely related to *M. albida*. Bentham (Trans. Linn. Soc. 30:390. 1875) lists Panama as included in the range of *M. albida* as he interpreted the species. Without any attempt to evaluate B. L. Robinson's subdivision of *M. albida* into varieties, I have here followed the 'North American Flora' in pigeon-holing a number of different variants, including *M. Williamsii* Standley, under the early name of *M. albida*. Even then it is difficult to find any hard-and-fast difference between this species and *M. sensitiva* L. of South America.

M. albida is of a weedy nature, invading cleared and pastured lands where it often becomes a serious pest in forming nearly impenetrable tangles. Like other members of the group it is at least moderately "sensitive" to contact.

3. *MIMOSA PANAMENSIS* (Benth.) Standl. in Contr. U. S. Nat. Herb. 18:104. 1916.

Mimosa debilis H. & B. ex Willd. var. *panamensis* Benth. in Trans. Linn. Soc. 30:391. 1875.

A sprawling subherbaceous or suffruticose annual, the branchlets slender, sparingly to heavily hirsute, sparingly to moderately recurved-aculeate. Leaves moderately small, bipinnate, the pinnae a single pair, the leaflets only 2 pairs per pinna; petiole slender, 15-40 mm. long, sparingly armed or unarmed, eglandular; pinnular axis very short, seldom 5 mm. long; leaflets asymmetrically obovate to oblong, usually broadest above the middle, up to 2 cm. long and 4-7 mm. wide, the inner

member of the basal pair very reduced, usually obtuse or rounded and briefly mucronate apically, obliquely rounded basally, strigose-pubescent on both upper and (more heavily) lower surface, the venation prominent below; stipules linear, about 4 mm. long, pectinate-ciliate. Inflorescence of axillary, pedunculate heads, racemose terminally because of non-foliate nodes; peduncles up to 3 cm. long, subglabrous; heads dense, globular; floral bractlets linear-lanceolate, 1-2 mm. long, pectinate-ciliate. Flowers small, sessile, pinkish-white?; calyx campanulate, minute; corolla funnelform, about 2 mm. long, membranous, usually puberulent apically, 4- (5?) -lobed, the lobes less than half as long as the tube; stamens 4 (5?), about 6 mm. long, glabrous, the anthers orbicular; ovary subglabrous. Legume oblong, mostly 1-1.5 cm. long and 3-5 mm. wide, flat, few-segmented, the persistent margins heavily setose-spinose, the valves less heavily so.

Costa Rica, Panama, and Colombia.

CANAL ZONE: Ancón Hill, Bro. Celestine 66; Standley 25191, 26321; Killip 12082. COCLÉ: Aguadulce, Pittier 4952; Nata, Seemann 98. PANAMÁ: Corozál Road, Standley 26784, 29173; Killip 3146; northeast of Panama City, Bro. Paul 206. VERAGUAS: Soná, Allen 1061.

It is possible that the species should be *M. sensitiva* L. (considered broadly) or but a form of *M. albida* (which in turn does not seem to be clearly distinct from *M. sensitiva*). The point is debatable as to whether it is worthy of better than varietal rank, but as a variety it would seem as much akin to *M. albida* or *M. Velloziana* as to *M. debilis*.

4. MIMOSA CASTA L. Sp. Pl. 518. 1753.

Mimosa dominicana Desv. in Ann. Sci. Nat. Bot. 9:424. 1826, fide Benth.

Scandent, suffruticose plants, the branchlets subterete but angled or ridged, glabrous or somewhat pubescent, densely armed with recurved, broad-based thorns. Leaves moderately large, bipinnate, the pinnae 1 pair, the leaflets mostly 3-4 pairs; petiole elongate, as much as 10 cm. long, eglandular, callous basally, apiculate terminally, armed like the twigs; pinnae 3-7 cm. long, the rachis pulvinate and usually aculeate; leaflets inequilaterally elliptic to oblong-lanceolate, mostly 10-30 mm. long and 5-15 mm. wide, acute apically, obliquely rounded basally, callous basally and with a few conspicuous palmate veins, setose-ciliate on the margins, sometimes with a few appressed setae on the lower surface; stipules narrowly linear-lanceolate, falcate, commonly about 5 mm. long, striate. Inflorescence of axillary, pedunculate heads; peduncles short, 5-15 mm. long; heads globular, several- to many-flowered, the floral bractlets linear-lanceolate, 1-2 mm. long. Flowers small, sessile, dense, whitish; calyx very minute; corolla funnelform, 1-2 mm. long, glabrous, 4-lobed, the lobes half as long as the tube; stamens 4, about 1 cm. long, free, glabrous; ovary short, setose, bilateral, the style slightly exceeding the stamens. Legume oblong, usually 30-40 mm. long and about 12 mm. wide, flat, glabrous, 4- to 5-segmented, the margins setose-spinose and persistent.

Panama and north coast of South America to Brazil; Lesser Antilles.

CANAL ZONE: Miraflores, Pittier 2198; Pedro Miguel, Allen 2.

5. *MIMOSA PUDICA* L. Sp. Pl. 518. 1753.

Bentham (Trans. Linn. Soc. 30:397. 1875) lists the following synonyms for *M. pudica*: *M. endymionis* Mart.; *M. hirsuta* Moq. & Sess.; *M. bispidula* HBK.; *M. irritabilis* Presl; *M. pudibunda* Willd.; *M. striato-stipula* Steud.; *M. tetrandra* H. & B.; *M. unijuga* Duchass. & Walp.

Prostrate herb to somewhat suffruticose, the branchlets terete, glabrous or pubescent (often both glabrous and pubescent branchlets on same plant), heavily or lightly armed with recurved thorns, the thorns broad-based and black-tipped. Leaves moderately small, sensitive, bipinnate, the pinnae 1 or (more commonly) 2 pairs, the leaflets mostly about 16 pairs; petiole elongate, up to 4 cm. long, subterete, glabrous or pubescent and sometimes even aculeate, eglandular, with a conspicuous basal pulvinus; rachis short (2-3 mm.) or obsolete; pinnae congested, the pinnular rachis and pulvinus usually setose, with a pair of squami just above the pulvinus; leaflets linear or linear-oblong, 3-12 mm. long and mostly 1-2 mm. wide, abruptly acute or subobtuse apically, inequilaterally truncate or rounded basally, with 1 or 2 smaller basal veins in addition to the costa, venation remote but visible below, glabrous except the margins (and sometimes the lower surface) yellow-setose; stipules linear-lanceolate, falcate, 4-8 mm. long, setose. Inflorescence of axillary, pedunculate, head-like spikes; peduncle about 2 cm. long in maturity; spikes short, very condensed, many-flowered; floral bractlets linear-lanceolate or linear-oblong, setose. Flowers pinkish, sessile; calyx extremely minute, only a fraction of a mm. long; corolla funnelform, 1-2 mm. long, glabrous, 4-lobed, the lobes about half as long as the tube; stamens 4, about 7 mm. long, free, glabrous; anthers minute, nearly orbicular; ovary small, glabrous, bilateral, the style about equalling the stamens. Legumes typically in a dense cluster, usually 10-15 mm. long and about 4 mm. wide, flat, glabrous, segmented, somewhat constricted between the articulated, 1-seeded segments, heavily setose-aculeate on the margins, the margins persisting after dispersal of the segments.

Southern Mexico to middle South America; West Indies. Introduced into Old World tropics; cultivated under glass in temperate regions.

BOCAS DEL TORO: Chiriquí Lagoon, H. von Wedel 1492, 1610, 2870. CANAL ZONE: "Chagres", Fendler 96; Gatún, Hayes 159; Las Cruces trail, Hunter & Allen 726; Quebrada La Palma, Dodge & Allen 17358. CHIRIQUÍ: Boquete, Woodson & Schery 721; Llanos del Volcán, Seibert 324, 351. COCLÉ: Aguadulce, Pittier 4861; Penonomé, Williams 100. PANAMÁ: Chepo, Pittier 4760; Taboga Island, Standley 27052.

This interesting "plant oddity" is well known for its ability to quickly fold and droop its leaves with contact or other stimuli. Walking through a field of "sensitive plant" in the tropics one can look back and easily discern the path taken because of the altered position of the leaves brushed against. The plant shows a similar response to darkness or disturbance by rainfall. It is frequently kept as a curiosity, both in the tropics and in greenhouses of temperate climates. The species is abundant in open lowland areas in Panama, but also occurs at higher

elevations. It is similar to *M. polydactyla*, and is distinguishable from the Mexican *M. affinis* only by a difference in legume setae.

6. *MIMOSA POLYDACTYLA* Humb. & Bonpl. ex Willd. Sp. Pl. 4:1033. 1806.

An herbaceous to suffrutescent plant, the branchlets terete, pubescent or glabrate, sparingly or densely armed with broad-based, black-tipped thorns. Leaves moderate or moderately large, sensitive, bipinnate, the pinnae 3-5 (usually 4) pairs clustered at the apex of the petiole (hence subdigitate), the leaflets usually about 30 or more pairs; petiole elongate, up to 8 cm. long, eglandular, usually setose; rachis very condensed, scarcely 3 mm. long; pinnae as much as 12 cm. long, the basal pinnular pulvinus setose; leaflets linear, 4-9 mm. long and usually 1-2 mm. wide, usually acute apically, inequilaterally rounded basally, the costa and remote lateral veins subprominent, glabrous except setose marginally and occasionally below; stipules linear-lanceolate, falcate, about 5 mm. long, setose. Inflorescence of axillary, pedunculate heads or very short spikes; peduncles short, usually little more than 1 cm. long; heads dense, many-flowered; floral bractlets sublinear, setose-laciniate. Flowers pinkish or purplish, sessile; calyx extremely minute; corolla funnelform, about 2 mm. long, glabrous, 4-lobed; stamens 4, several mm. long, free; ovary glabrous, bilateral, the style equalling the stamens. Legumes typically in a dense cluster, usually 10-15 mm. long and about 4 mm. wide, flat, glabrous, segmented, somewhat constricted between the articulated, 1-seeded segments, heavily setose-aculeate on the margins, the margins persisting after dispersal of the segments.

Panama to Brazil.

"WESTERN PANAMÁ": Stork, July-Aug. 1923.

Mimosa polydactyla is apparently less frequent in its range than is *M. pudica*. It is very similar to *M. pudica*, but possesses more numerous pinnae and leaflets and has shorter peduncles than is characteristic of the latter species.

7. *MIMOSA PUSILLA* Benth. in Bot. Voy. Sulphur, 90. 1844.

Low, prostrate or semi-prostrate herb, the branchlets glabrous to setose or lightly hirsute, scarcely armed (thorns, if present, few, nearly straight, weak), terete or subterete, inconspicuously lenticellate. Leaves small, bipinnate, the pinnae 1-3 pairs opposite on the rachis, the leaflets 5-20 pairs per pinna; petiole less than 1 cm. long, glabrous or pubescent like the twigs, terete, eglandular; rachis similar to the petiole, eglandular but with setiform appendages, the rachial internodes about equalling the petiole; pinnae remote (i. e. not subdigitate), 5-35 mm. long; leaflets linear-oblong, 3-8 mm. long and 1-1.5 mm. wide, broadly acute to obtuse and briefly mucronulate apically, obliquely rounded or subtruncate basally, glabrous except often ciliate-margined, the costa and lateral veins quite conspicuous (the lateral veins curving upward to subparallel the costa); stipules ovate, 2-4 mm. long, acuminate, longitudinally striate. Inflorescence of solitary, axillary, pedunculate heads; peduncles short, rarely even as much as 1 cm. long, pubescent as the

twigs, ebracteate except at the head; head small, more or less obconic, few- to several-flowered, nearly ensheathed (at least in youth) by the prominent floral bracts; floral bracts ovate-lanceolate, usually 2-3 mm. long, subscarious and striate, usually ciliate but otherwise glabrous. Flowers small, pinkish; calyx campanulate, minute, glabrous; corolla funnelform, 1-2 mm. long, membranous, glabrous, 4-lobed; stamens 8 (sometimes fewer?), 3-4 mm. long, glabrous; ovary glabrous. Legume oblong, typically less than 1 cm. long and about 4 mm. wide, flat, setose, 1- to 3-jointed, the joints separating from the margins in age.

Mexico to Panama.

PANAMÁ: Pearl Islands, San José Island, I. M. Johnston 177, 818, 818A.

The Johnston collections constitute a new record from Panama for this interesting species, concerning which I. M. Johnston is publishing notes elsewhere (in mss. as this is written). The species is the smallest, least offensive of any of the genus in Panama, and is not apt to be confused with other species except perhaps *M. pudica*. I have not had opportunity to examine the type of the species, but there seems little doubt that the name applies to the Panama collections. The Colombian *M. martensis* Britt. & Rose may be a more pubescent variety of *M. pusilla*.

8. *MIMOSA INVISA* Mart. in Flora 20:Beibl. 2:121. 1837.

Schrankia brachycarpa Benth. in Hook. Jour. Bot. 2:130. 1840, fide Benth.

Mimosa diplotricha C. Wright in Sauvalle, An. Acad. Habana 5:405. 1896, fide Britt. & Rose.

Morongia pilosa Standl. in Contr. U. S. Nat. Herb. 18:105. 1916, fide Britt. & Rose.

Schrankia pilosa Macbride, in Contr. Gray Herb. 59:11. 1919.

Herb or small shrub, prostrate, decumbent or scandent, the branchlets strongly angled, subtetragonal, usually lightly pilose (sparingly so on older twigs especially), copiously armed with recurved thorns. Leaves reportedly sensitive, moderate, bipinnate, the pinnae mostly 4-7 pairs opposite on the rachis, the leaflets several to many (usually about 15-20) pairs per pinna; petiole elongate, 2-5 cm. long, characteristically exceeding the rachis, eglandular, pulvinate, acuminate; rachis equaling or almost equalling and similar to the petiole, bearing setiform appendages at insertion of the pinnae; pinnae comparatively remote, mostly 2-3 cm. long, bearing just above the pulvinus usually paired, setiform appendages; leaflets linear or linear-oblong, 2-5 mm. long and about 1 mm. wide, bluntly acute or subobtusely apically, inequilaterally rounded or subtruncate basally, lightly pubescent or subglabrous, the costa visible but secondary venation obscure; stipules setiform, about 4 mm. long. Inflorescence of pedunculate heads solitary to few-fasciculate from older foliate and subterminal non-foliate nodes; peduncles normally no more than 1 cm. long, acuminate and usually sparingly pubescent; heads compact, globular, several- to many-flowered; floral bractlets oblanceolate, about 1 mm. long, glabrous. Flowers sessile, pink; calyx cupular, much less than 1 mm. long, glabrous; corolla funnelform, 2-3 mm. long, glabrous, 4-lobed, the lobes about equalling the tube;

Fig. 100. *Mimosa somnians*

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stamens 8, about 6 mm. long, the filaments thickish, the anthers about $\frac{1}{2}$ mm. long; ovary short, verrucose laterally, the style equalling the stamens, the stigma narrow. Legume oblong, usually less than 2 cm. long and about 5 mm. wide, flat, segmented, normally pilose, the persistent margins setose-spinose.

Mexico to Argentina; West Indies.

BOCAS DEL TORO: Almirante, Rowlee & Stark 498. CANAL ZONE: Corozal, Standley 27368; Summit, Standley 26951. PANAMÁ: Chepo, Pittier 4544; Juan Franco Race Track, Standley 27798. PROVINCE UNKNOWN: Las Delicias, Carleton 41.

Mimosa invisa is on the "continental divide" between *Mimosa* and *Schrankia*; vegetative and floral appearance is that of *Schrankia*, but the comparatively broader legume necessitates inclusion in *Mimosa*. The species is another "sensitive plant" or *dormilona*, rather easily distinguishable from *M. pudica* by the comparative remoteness of the pinnae. The plant frequently invades cleared areas, where it becomes an objectionable weed, potentially a source of severe lacerations to the unwary. Pittier reports various parts or infusions of the plant to be both mildly toxic and medicinal. *M. invisa* has a great many expressive local names, such as *malicia de mulher* in eastern Brazil and *raspacanilla* in lower Central America.

9. *MIMOSA* SOMNIANS Humb. & Bonpl. ex Willd. Sp. Pl. 4:1036. 1806.

Mimosa palpitans H. & B. ex Willd. loc. cit. 1806, fide Benth.

Mimosa somniflora HBK. Nov. Gen. & Sp. 6:257. 1824, fide Benth.

Mimosa acutiflora Benth. in Hook. Jour. Bot. 4:397. 1842, fide Benth.

Mimosa podocarpa Benth. loc. cit. 1842, fide Benth.

Mimosa quadrijuga Salzm. ex Benth. loc. cit. 398. 1842, fide Benth.

Decumbent or nearly erect or even subscandent herb or subshrub, the branchlets subterete, longitudinally striate, usually pilose with gland-tipped hairs, sparingly or moderately aculeate with broad-based, recurved thorns. Leaves moderate, bipinnate, the pinnae usually about 4 (2-8) pairs opposite on the rachis, the leaflets many (20 more or less) pairs per pinna; petioles moderate, 1-3 cm. long, normally shorter than the rachis, armed and pubescent like the branchlets, otherwise eglandular; rachis 1.5-8 cm. long, like the petiole but less pubescent, bearing a subulate appendage at insertion of each pair of pinnae; pinnae 1-4 cm. long, setose-spinose particularly on the pulvinus; leaflets broadly linear, 2-5 mm. long and usually less than 1 mm. wide, rounded or obtuse apically, obliquely subtruncate basally, glabrous or sparingly puberulent, the venation obscure except for the costa; stipules lanceolate-subulate, about 5 mm. long, pubescent. Inflorescence of pedunculate heads solitary or few-fasciculate from both non-foliate subterminal nodes and lower foliate nodes, thus appearing racemose distally; peduncles up to 3 cm. long in age, most frequently glabrous; heads globular, compact; floral bractlets ovate-lanceolate, about 1 mm. long, ciliate. Flowers sessile, pink; calyx minute, much less than 1 mm. long; corolla funnelform, about 3 mm. long, glabrous, markedly striate, the 4 lobes about equalling the tube, subrigid and pointed in bud; stamens 8, about 7 mm. long, glabrous, the filaments somewhat thickish. Legume narrowly linear,

4-7 cm. long and about 4 mm. wide, flat, several-segmented, stipitate, usually glandular-pubescent and setose when young, less prominently so in age, the persistent margins short aculeate-setose.

Mexico to Argentina.

CANAL ZONE: Balboa, Standley 26063; Fort Kobe Road, Woodson, Allen & Seibert 1410. CHIRIQUÍ: Boquete, Woodson & Schery 796; Pittier 3321. COCLÉ: El Valle de Antón, Allen 470, 2817. PANAMÁ: without data, M.B.G. 1090295; "Sabanas", Bro. Paul 57; Tumba Muerto Road, Standley 29770. PROVINCE UNKNOWN: without locality, Seemann 105.

This species is rather well distinguished by the glandular pubescence (usually) and striate corolla. Along with certain other species it seems to bear the common name *dormilon* in Central America, indicating that it too is a "sensitive plant" responding visibly to contact or other stimuli. It seems to prefer open, moist, often sandy habitats at moderate elevations.

10. *MIMOSA PIGRA* L. Cent. Pl. in Amoen. Acad. 4:274. 1755.

Mimosa asperata L. Syst. Nat. ed. 10, 1:12. 1759.

Mimosa polyacantha Willd. Sp. Pl. 4:1034. 1806, fide Benth.

Mimosa hispida Willd. loc. cit. 1037. 1806, fide Benth.

Mimosa canescens Willd. loc. cit. 1038. 1806, fide Benth.

Mimosa pellita H. & B. ex Willd. loc. cit. 1037. 1806, fide Benth.

Mimosa ciliata Willd. Enum. Hort. Berol. 1048. 1809, fide Benth.

Bentham also lists other African and Far Eastern synonyms.

Shrub to a few meters tall, sometimes scandent, the branchlets usually conspicuously setose-hispid and armed with formidable recurved thorns. Leaves reported sensitive, moderate to large, bipinnate, the pinnae up to 15 or even more pairs opposite on the rachis, the leaflets usually about 25 or 30 pairs per pinna; petiole comparatively short, seldom more than 1 or 2 cm. long, eglandular, hispid like the twigs, usually aculeate; rachis 4-25 cm. long, similar to the petiole, eglandular, the thorns frequently becoming acicular; pinnae 2-7 cm. long, hispid; leaflets linear, 2-8 mm. long and approximating 1 mm. in width, acute apically, inequilaterally rounded or subtruncate basally, appressed-pubescent (especially below) and setose-ciliate margined, longitudinally few-veined, these veins prominent below; stipules ovate-lanceolate, as much as 8 mm. long, pubescent. Inflorescence of solitary or few-fasciculate, pedunculate heads, axillary from foliate and subterminal non-foliate nodes; peduncles up to 5 cm. long in age, hispid; head ovoid, dense; floral bractlets linear, 2-3 mm. long, pectinate above the middle. Flowers sessile, whitish; calyx tubular, about 2 mm. long, cleft to one side, lacinate apically, glabrous; corolla funnellform, about 4 mm. long, short-hispid apically, the 4 lobes less than $\frac{1}{2}$ the length of the tube; stamens 8, free, the filaments scabrous and expanded distally; ovary setose-hispid. Legume linear-oblong, mostly 4-7 cm. long and little more than 1 cm. wide, short-beaked, stipitate, flat, 7- to 20-segmented, densely hispid-setose both on the persistent margins and on the segments.

Mexico to Brazil and Peru; West Indies; Africa and Far East (introduced?).

CANAL ZONE: "Chagres", Fendler 98; Frijoles, Bro. Heriberto 84. COCLÉ: Penonomé, Williams III. PANAMÁ: between Panamá and Chepo, Dodge, Hunter, Steyermark & Allen 16684; Bro. Maurice 761; Tumba Muerto Road, Standley 20832.

The species is distinctive except in Mexico where a smaller, less pubescent form has been regarded as a separate species (*M. Berlandieri* A. Gray) or variety (var. *Berlandieri* (Gray) Robins.). The heavy, coarse pubescence and multipinnular leaf serve to distinguish it from other species through most of its range. *M. pigra* is said to be almost as sensitive as the renowned *M. pudica*, contracting its leaves quickly when disturbed. It bears, as does *M. pudica*, the expressive local name of *dornilona* as well as *pica-pica* in lower Central America, where it is a common weed of moist but open lowland areas.

8. SCHRANKIA Willd.

SCHRANKIA Willd. Sp. Pl. 4:1041. 1806, not Medic. 1792; nom. conserv.

Leptoglottis DC. Mem. Legum. 451. 1825.

Morongia Britt. in Mem. Torrey Bot. Club 5:191. 1894.

Perennial herbs or subshrubs, often decumbent or clambering, armed with recurved thorns, the branchlets usually markedly angulate. Leaves moderate or moderately small, bipinnate, usually sensitive, the pinnae few or several remote pairs opposite on the rachis, the leaflets several to many pairs per pinna; petiole comparatively elongate, in many species exceeding the rachis, aculeate, eglandular; rachis similar to the petiole, eglandular but with subulate appendages at insertion of pairs of pinnae; pinnae usually bearing a pair of bract-like mucrons just above the basal callus; leaflets small, usually inequilateral basally, the venation obscure or less frequently prominent; stipules linear-subulate, arcuate, subpersistent. Inflorescence of axillary, pedunculate heads; peduncles short (most South American species) or moderately elongate (many Mexican and North American species); heads dense, globular; bractlets small, concave but not peltate. Flowers small, essentially sessile, mostly 5-merous, pinkish, the upper ones perfect, the lower ones usually staminate; calyx small, nearly campanulate, prominently toothed, usually glabrous; corolla funnelform-campanulate, sympetalous, the teeth or lobes prominent, usually glabrous; stamens 8-13 (usually 10), free (except perhaps at base), exserted; anthers small, ovate-orbicular, eglandular; ovary nearly symmetrical, usually glabrous, several- to many-ovulate, briefly stipitate; style about equalling the stamens; stigma terminal, not expanded. Legume narrowly linear, terete or at least turgid, usually aculeate, not jointed, the face of the valves separating from the margins in dehiscence (thus at length longitudinally 4-valvate), usually with a brief or elongate acuminate beak; seeds longitudinal, oblong, obliquely truncate, blackish.

Temperate and tropical North America to middle South America; West Indies; introduced into Africa, Pacific Islands, and Far East.

Schrankia is a small genus, distinguishable from *Mimosa* only with difficulty, and reliably only in mature fruit. Except that *Schrankia* has been traditionally separated from *Mimosa*, there seems little more justification in recognizing it than a great many Britton & Rose segregate genera not commonly accepted. As is typical of most genera of the MIMOSOIDEAE, species within the genus are not clear-cut. Of the 27 species listed by Britton & Rose (N. Am. Fl. 23:138-144) only a fraction are likely tenable. Two species are reported to occur in Panama, probably both of them "good" but possibly grading into "species" of Mexico and the United States.

- a. Pinnae mostly 2-3 pairs; venation of leaflet except for the costa obsolete; legume about 4 mm. wide, long-beaked..... 1. *S. LEPTOCARPA*
 aa. Pinnae mostly 4-5 pairs; leaflet venation delicately reticulate below; legume 5-6 mm. wide, short-beaked..... 2. *S. HAMATA*

1. *SCHRANKIA LEPTOCARPA* DC. Prodr. 2:443. 1825.

Leptoglottis leptocarpa (DC.) Standl. in Jour. Wash. Acad. 15:458. 1925.

?*Schrankia trijuga* Goyena, Fl. Nic. 1:379. 1909.

Perennial, subherbaceous plant, decumbent, straggling or somewhat scandent; branchlets lightly to heavily armed with recurved thorns, glabrous, angled or sub-tetragonal. Leaves moderate but slender and lax, bipinnate, the pinnae mostly 2-3 pairs (rarely 1 or 4-5 pairs), the leaflets ordinarily about 10-15 pairs per pinna; petiole elongate, 2-8 cm. long, subglabrous, generally armed like the branchlets, eglandular; rachis 1-4 cm. long, similar to the petiole, bearing above at insertion of the pairs of pinnae 1-2 subulate, stipule-like appendages (these sometimes caducous); pinnae 1-4 cm. long, callous basally and usually bearing there a pair of minute, bract-like mucrons; leaflets linear-oblong to narrowly obovate-elliptic, 3-10 mm. long and 1-2 mm. wide, rounded-submucronate or obtuse apically, inequilaterally rounded basally, glabrous except ciliate-margined, dull, the venation obscure; stipules linear-subulate, curved, few to several mm. long. Inflorescence of axillary, pedunculate heads; peduncles short, mostly about 1 cm. long, eglandular; heads several-flowered, orbicular, the bractlets lanceolate or oblanceolate. Flowers subsessile, pinkish; calyx campanulate, considerably less than 1 mm. long, glabrous, irregularly 5-toothed; corolla funnelform-campanulate, about 2 mm. long, glabrous, the 5 teeth almost equalling the tube; stamens 10, about 6 mm. long, free, glabrous, the anthers ovate-orbicular; ovary substipitate, verrucose. Legume linear, up to 12 cm. long, acuminate-subulate, moderately aculeate, the thorns in 3 rows on each margin with an additional row on each valve, subglabrous, the valves separating from the margins in dehiscence.

Central America and West Indies to middle South America; introduced into Old World tropics.

CANAL ZONE: Ancón, Pittier 6769. COCLÉ: Aguadulce, Pittier 4835; Penonomé, Williams 109. PANAMÁ: Las Sabanas, Bro. Heriberto 263; Standley 25935.

Certain species of Mexico and the southern United States are remarkably similar to *S. leptocarpa*. For example, *S. Roemeriana*, a number of specimens commonly passing as *S. microphylla* (= *S. horridula*, = *S. uncinata*, = *S. angustata*), and several Small and Britton & Rose species are difficultly separable from it. Yet the name *S. leptocarpa* has priority over most possible synonyms, and will likely endure.



Fig. 101. *Schrankia hamata*

2. *SCHRANKIA HAMATA* Humb. & Bonpl. ex Willd. Sp. Pl. 4:1042. 1806.

Mimosa tetragona Poir. in Lam. Encycl. Meth. Suppl. 1:56. 1810, fide Benth.

Leptoglottis hamata Standl. in Jour. Wash. Acad. 15:458. 1925.

Slender, clambering, mostly glabrous, herbaceous plant, the branchlets pentagonal and copiously armed on the ridges with recurved thorns. Leaves bipinnate, the pinnae usually 4-5 pairs, the leaflets mostly 10-20 pairs; petiole moderate, about 5 cm. long, it and the rachis aculeate; rachis usually exceeding the petiole, eglandular but with interpinnular mucrons; leaflets linear, up to 7 mm. long, acute

or obtuse apically, inequilaterally truncate basally, glabrous except sparingly ciliate on the margins, delicately reticulate-veined below. Peduncles axillary, about 1 cm. long, pubescent, often aculeate; head globose. Flowers small, dense, sessile; calyx campanulate, about $\frac{1}{2}$ mm. long, glabrous, briefly 5-dentate; corolla funnelliform, about 3 mm. long, glabrous, 5-lobate, united below for about $\frac{1}{3}$ its length; stamens 10, about 6 mm. long, glabrous, free; anthers ovate, about $\frac{1}{2}$ mm. long; ovary glabrous, briefly stipitate, multi-ovulate, angled, with the style 4-5 mm. long. Legume 6-10 cm. long and about 5 mm. wide, terete-tetragonal, heavily setose-aculeate, the beak being about 1 cm. long.

Panama and Colombia.

CANAL ZONE: Ancón, Pittier 6863; Balboa, Standley 32113; Bella Vista, Piper 5114. DARIÉN: Pinogana, Allen 4277. PANAMÁ: Corozal road, Standley 26761; Panamá, Macbride 2609; Standley 27700; Tumba Muerto road, Standley 29702.

Schrankia hamata is reported quite common in Colombia and Panama. It apparently is distinct from *S. leptocarpa* (in having a thicker, more spiny legume, larger leaves with more pinnae, and leaflets with lateral veins distinct), but may not be separable from certain Mexican species.

9. NEPTUNIA Lour.

NEPTUNIA Lour. Fl. Cochinch. 653. 1790.

Hemidesmas Raf. Sylva Tellur. 119. 1838, in part.

Generally herbs but sometimes somewhat woody, of moist or swampy ground and sometimes free-floating on ponds or quiet water, the branchlets unarmed, not lenticellate, in most species glabrous, occasionally spongy-inflated in submerged stems. Leaves usually moderate, bipinnate, the pinnae opposite, few, the pairs moderately remote, the leaflets several to many pairs, small; petiole prominent, glandular or eglandular; rachis similar to and usually approximating the petiole, eglandular; leaflets nearly linear, inequilateral basally, usually glabrous but often ciliate, the venation prominent or obscure; stipules conspicuous, often cordate-subclasping, sometimes striate-nerved. Inflorescence of axillary, pedunculate heads or very short spikes, usually solitary; peduncles elongate, commonly bearing 2 small or large bracts; heads dense, mostly obovoid, the basal flowers staminate or sterile and smaller in bud, the upper flowers perfect, larger in bud. Flowers sessile, usually yellowish, the basal ones with prominent petaloid staminodia, the perfect ones relatively inconspicuous; calyx synsepalous, more or less cupulate, 5-parted; corolla of 5 free petals or these in some cases coherent near the middle (but free below and above), usually glabrous; stamens or staminodia mostly 10, free; ovary generally glabrous, the stout style elongate and bearing an expanded stigma. Legume short and broad, flat, unarmed, 2-valved, not septate nor the valves separating from the margins, the seeds transverse.

World tropics and subtropics; in the Western Hemisphere from middle United States to Brazil.

Neptunia is a small genus, containing 6 or fewer species in the Americas. Decandolle and others included it as a section of *DESMANTHUS*, but more recently it has been generally accepted as a distinct genus. It is unusual and distinctive in possessing basal flowers of the head with conspicuous petaloid staminodia, and in preferring aquatic or swamp habitats.

- a. Stipules striate-nerved; leaflets ciliate, the venation remote but prominent below; petals coherent about at the middle; peduncular bracts borne above the middle..... 1. *N. PUBESCENS*
- aa. Stipules scarcely nerved; leaflets glabrous, the venation obscure; petals free; peduncular bracts borne near and below the middle, or absent.
 - b. Not floating, the stem seldom developing a spongy outer tissue; petiole glandular; flowers yellow..... 2. *N. PLENA*
 - bb. Free-floating, with a thick spongy outer tissue on the submerged stem; petiole eglandular or merely callous apically; flowers whitish?.. 3. *N. PROSTRATA*

1. *NEPTUNIA PUBESCENS* Benth. in Hook. Jour. Bot. 4:356. 1842.

Neptunia floridana Small, in Bull. Torrey Bot. Club 25:138. 1898.

Neptunia Lindheimeri B. L. Robins., in Proc. Am. Acad. 33:333. 1898.

Neptunia microcarpa Rose, in Contr. U. S. Nat. Herb. 8:300. 1905.

Slender herb or subshrub, prostrate or ascending from a somewhat woody base, the branchlets terete, glabrous or pubescent. Leaves moderate or moderately small, bipinnate, the pinnae 2-4 (normally 3) pairs opposite on the rachis, the leaflets many (12-40) pairs per pinna; petiole slender, 1-2 cm. long, pubescent or glabrous, eglandular; rachis about as long as the petiole, eglandular, terminally apiculate; pinnae mostly 2-4 cm. long, moderately remote, the axis somewhat alate; leaflets linear-oblong, 3-5 mm. long and 1-2 mm. wide, obtuse apically, obliquely rounded basally, usually glabrous except for a ciliate margin, the venation prominent below but remote; stipules ovate or lanceolate, about 4-5 mm. long, prominently longitudinally striate-nerved, subsistent. Inflorescence of solitary, axillary, pedunculate heads; peduncles elongate, up to 6 cm. long in age, usually minutely 1- to few-bracteate near or above the middle; heads globose to briefly oblong, bearing dimorphic flowers; floral bractlets lanceolate or oblanceolate, about 2 mm. long, ciliate or glabrous. Flowers of 2 (?) types, the few lower ones of head unisexual and with conspicuous petaloid stamens or staminodia; upper flowers without petaloid stamens or staminodia, usually perfect (occasionally with pistil aborted), sessile, yellow; calyx cupulate-funnelform, about 2 mm. long in perfect flowers, somewhat shorter in basal flowers, prominently 5-lobed, the lobes usually ciliate; corolla funnelform, about 3 mm. long in perfect flowers, somewhat shorter in basal flowers, glabrous, 5-lobate, the lobes about equalling the imperfectly closed tube; stamens (or staminodia) usually 10, glabrous, 5-6 mm. long; ovary glabrous, subfusiform, the style stout and about equalling the stamens. Legume broadly oblong, mostly 2-3 cm. long and 1 cm. wide or wider, flat, rounded apically and briefly mucronate, substipitate basally, 2-valved, few-seeded, glabrous, the seeds transverse and slightly oblique.

Florida to Texas and Mexico; West Indies; southern Central America; Peru; southern South America.

COCLÉ: Aguadulce, Pittier 4962.

This species is readily distinguished from others of the genus in Panama by the striate stipules, adherent petals, and ciliate leaflets with prominent venation. The species much resembles *N. lutea* of the United States.

2. *NEPTUNIA PLENA* (L.) Benth. in Hook. Jour. Bot. 4:355. 1842.

Mimosa plena L. Sp. Pl. 519. 1753.

Mimosa punctata L. Sp. Pl. ed. 2, 1502. 1763.

Desmanthus plenus Willd. Sp. Pl. 4:1045. 1806.

Desmanthus punctatus Willd. loc. cit. 1047. 1806.

Mimosa lycopodioides Desf. in Pers. Syn. Pl. 2:263. 1807, fide Benth.

Acacia lycopodioides Desv. in Jour. Bot. 3:68. 1814.

Desmanthus polyphyllus DC. Prodr. 2:444. 1825, fide Benth.

Acacia punctata Desf. Cat. Hort. Par. 300. 1829.

Mimosa adenantha Roxb. Fl. Ind. 2:554. 1832, fide Benth.

Neptunia polyphylla Benth. in Hook. Jour. Bot. 2:129. 1840.

Neptunia surinamensis Steud. in Flora 26:759. 1843, fide Benth.

Desmanthus comosus A. Rich. Ess. Fl. Cub. 475. 1845, fide Griseb.

Subprostrate or ascending subshrub of swampy habitats, the branchlets glabrous, not lenticellate. Leaves moderately small, bipinnate, the pinnae 2-4 (mostly 3) pairs opposite on the rachis, the leaflets 10-25 pairs per pinna; petiole 1-2 cm. long, glabrous, somewhat flattened above, bearing a sessile, orbicular gland apically just below insertion of lowermost pair of pinnae; rachis 1-4 cm. long, similar to the petiole, eglandular (except for gland already noted at apex of petiole), terminally apiculate; pinnae 1-5 cm. long, the pairs moderately remote from one another; leaflets linear or linear-spatulate, 3-10 mm. long and 1-2 mm. wide, rounded or obtuse and usually very briefly mucronate apically, obliquely subtruncate basally, glabrous, all venation obscure; stipules obliquely ovate-lanceolate and subclasping, usually about 5 mm. long. Inflorescence of axillary, pedunculate heads or very short spikes; peduncles up to 10 cm. long in age, glabrous, conspicuously bibracteate below the middle; heads dense, the floral bractlets obovate-lanceolate, little more than 1 mm. long. Flowers sessile, yellow, the upper ones perfect, the lower ones staminate or infertile and with 10 conspicuous petaloid staminodia 7-8 mm. long; calyx cupulate, about 1 mm. long, 5-lobed, glabrous; corolla of 5, free, spatulate petals about 3 mm. long, glabrous; stamens 10?, 4-5 mm. long, glabrous, the anthers almost 1 mm. long; ovary glabrous, dark; style stout, exceeding the stamens; stigma expanded, truncate. Legume oblong, 2-4 cm. long and about 1 cm. wide, apiculate, flat, glabrous, conspicuously stipitate, 2-valved, the seeds several, transverse.

Mexico and Guatemala, West Indies, Panama and Colombia to Brazil.

COCLÉ: Penonomé, Williams 97.

This species characteristically grows in marshy, open areas such as the shallow ponds of the savannas. *N. plena* can be distinguished rather readily from other species of *Neptunia*, except *N. prostrata*, by a variety of characters. However, occasionally plants appearing identical with *N. plena* (or other species) will develop the thick, fleshy, floating stems characteristic of *N. prostrata*. This stem characteristic has been the chief means of distinguishing *N. prostrata*.

3. NEPTUNIA PROSTRATA (Lam.) Baillon, in Bull. Soc. Linn. Paris 1:356. 1883.

Mimosa prostrata Lam. Encycl. Meth. 1:10. 1783.

Neptunia oleracea Lour. Fl. Cochinch. 654. 1790.

Mimosa natans Vahl, Symb. 3:102. 1794 (L.f. Suppl. 439. 1781. = nomen nudum).

Mimosa lacustris H. & B. Pl. Aequin. 1:55. 1806.

Desmanthus lacustris Willd. Sp. Pl. 4:1044. 1806.

Desmanthus natans Willd. loc. cit. 1806.

Mimosa aquatica Pers. Syn. Pl. 2:263. 1807, fide Benth.

Desmanthus stolonifer DC. Prodr. 2:444. 1825, fide Benth.

Acacia lacustris Desf. Cat. Hort. Paris, 301. 1829.

Neptunia stolonifera Guill., Perr. & Rich. Fl. Seneg. 239. 1830-33.

Prostrate, floating herb or "subshrub," the submerged stems spongy-inflated with a pithy outer surface, bearing nodular roots, the above-water stems glabrous, flexuous, not lenticellate. Leaves moderate, 2-ranked, bipinnate, the pinnae mostly 3 pairs opposite on the rachis, the leaflets usually about 15 pairs per pinna; petioles mostly 2-3 cm. long, glabrous, somewhat flattened above, eglandular or with an apical callus just below insertion of the basal pair of pinnae; rachis similar to and approximating the petiole; pinnae usually 2-4 cm. long, the pairs moderately remote from one another, glabrous; leaflets linear or linear-spatulate, 3-12 mm. long and 1-3 mm. wide, rounded or obtuse and often briefly mucronulate apically, obliquely rounded or subtruncate basally, glabrous, the venation obscure; stipules inequilaterally ovate-lanceolate, generally about 5 mm. long, glabrous, not striate. Inflorescence of axillary, pedunculate heads or very short spikes; peduncles elongate, as much as 15 cm. long, glabrous, usually bearing near or below the middle 2 rather small bracts; heads obovoid in bud, dense, bearing staminate or infertile flowers basally and perfect flowers apically. Flowers sessile, bi-(tri?)-morphic, reportedly whitish fading yellow; calyx of perfect flowers, cupulate-funnelform, about 2 mm. long (smaller in basal flowers), glabrous, 5-lobed; corolla of 5 linear-spatulate petals, about 4 mm. long, glabrous; stamens of perfect flowers about 10, 7-8 mm. long; staminodia of basal flowers normally 10, petaloid, as much as 15 mm. long, glabrous; ovary glabrous; style exceeding the stamens; stigma expanded, truncate. Legume oblong, 10-25 mm. long and about 8 mm. wide, flat, somewhat curved, stipitate, briefly beaked, glabrous, few-seeded, the seeds transverse.

World tropics. In Western Hemisphere: Mexico and Guatemala, West Indies, Panama and Colombia to Peru and Brazil.

COCLÉ: Aguadulce, Woodson, Allen & Seibert 1209.

There is some question as to whether the cited specimen may more properly

belong to this species or to *N. plena*. The floating nature of the spongy, inflated stem, however, warrants its inclusion as *N. prostrata*. Probably *N. prostrata* is not a valid species, but merely a form of *N. plena* growing floating in water and assuming a prostrate position.

10. DESMANTHUS Willd.

DESMANTHUS Willd. Sp. Pl. 4:1044. 1806, nom. conserv.

Acuan Medik. Theodora, 62. 1786.

Darlingtonia DC. in Ann. Sci. Nat. Bot. 4:97. 1825.

Acuania Ktze. Rev. Gen. Pl. 1:158. 1891.

Perennial, small, usually diffuse or decumbent shrubs, or subherbaceous. Leaves moderately small, bipinnate, the pinnae one to many pairs opposite on the rachis, the leaflets few or many pairs, opposite; petiole short, either it and/or the rachis bearing one or more subcupular glands, very rarely eglandular; leaflets small, obscurely veined in most species, glabrous or infrequently pubescent; stipules setiform. Inflorescence of axillary, pedunculate heads, the peduncle usually slender; head dense, usually few-flowered, the flowers more or less erect and the head then less than hemispherical; floral bracts nearly lanceolate, apparently never peltate as in most species of *Leucaena*. Flowers small, sessile, whitish or greenish; calyx synsepalous, more or less campanulate, 5-dentate; corolla essentially polypetalous, 5-parted, valvate, the petals narrowed basally; stamens 5 or 10 (staminodes 5 or 0), free, normally exceeding the perianth; anthers comparatively larger as in *Leucaena*, not smaller as in *Acacia*, eglandular; ovary subsessile, bilateral, several-ovulate, usually glabrous; style thickened above into a truncate-concave stigma. Legume small, linear, flat, 2-valved, straight or curved, sometimes somewhat constricted between the seeds, dehiscent from the apex (the rather thin, dehiscent valves subpersistent), subseptate or continuous; seeds usually oblique, compressed.

Temperate, subtropic and tropic regions of the New World; introduced into the Old World.

Desmanthus is obviously close to *Leucaena*, the basic floral and fruit characters being almost identical. However, whereas *Leucaena* consists chiefly of arborescent species, species of *Desmanthus* are small shrubs or subherbaceous. In Central America additional characters serve to rather readily separate these genera, the more obvious of which are used in the key to the genera.

Desmanthus is a small genus, but exceedingly troublesome from the standpoint of specific delimitation. As collections have accumulated it has become apparent that many of the characters on which species had been formulated do not hold constant, and that intergradation is rampant between almost all "species." Two specimens may appear distinct, but usually "connecting" specimens exhibiting all degrees of intergradation can be found to link them. Thus, for practical reasons, if no other, not more than a handful of species appear worthy of recog-

niton, and even these may not be readily distinguishable. On the basis of general observation of the genus the three "species" reportedly occurring in Panama are here combined under the oldest name, which thus considered is the only species known from Central America.

1. *DESMANTHUS VIRGATUS* (L.) Willd. Sp. Pl. 4:1047. 1806.

Mimosa virgata L. Sp. Pl. 519. 1753.

Mimosa pernambucana Mill. Gard. Dict. ed. 8, no. 3. 1768, not L., fide Britt. & Rose.

Mimosa angustisiliqua Lam. Encycl. Meth. 1:10. 1783.

Acuan virgatum Medik. Theodora, 62. 1786.

Acacia virgata Gaertn. Fr. & Sem. 2:317. 1791.

Desmanthus depressus H. & B. ex Willd. Sp. Pl. 4:1046. 1806.

Desmanthus diffusus Willd. loc. cit. 1806.

Mimosa depressa Poir. in Lam. Encycl. Meth. Suppl. 1:58. 1810.

Desmanthus strictus Bertol. Giorn. Arcad. 21:190. 1824.

Desmanthus leptophyllus HBK. Nov. Gen. & Sp. 6:264. 1824, fide Benth.

Desmanthus tenellus DC. Prodr. 2:445. 1825.

Acacia angustisiliqua Desf. Cat. Hort. Paris, ed. 3, 300. 1829.

Desmanthus pratorum Macf. Fl. Jam. 1:311. 1837.

Acacia depauperata Mart. in Steud. Nom. Bot., ed. 2, 4. 1841, fide Benth.

Desmanthus virgatus strictus Griseb. Fl. Br. W. Ind. 218. 1860.

Acacia leptosperma Bello, in Anal. Soc. Esp. Hist. Nat. 10:265. 1881.

Acuan depressus Ktze. Rev. Gen. Pl. 1:158. 1891.

Acuan latum Britt. & Rose, in N. Am. Fl. 23:132. 1928.

Acuan babamense Britt. & Rose, loc. cit. 1928.

Acuan insulare Britt. & Rose, loc. cit. 133. 1928.

Small shrub or subherbaceous, nearly erect or more commonly diffuse or decumbent, the branchlets essentially glabrous, angled or subtetragonal, scarcely lenticellate. Leaves moderately small, bipinnate, the pinnae 1-7 (mostly 2-4) pairs opposite on the rachis, the leaflets mostly 10-20 pairs per pinna; petiole usually no more than 5 mm. long, subterete, perhaps ciliate above, bearing apically at insertion of the lowermost pair of pinnae a large or small, orbicular to obovate, cupulate or patelliform, sessile gland; rachis usually flattened and lightly pubescent or ciliate above, eglandular (except for gland already described at juncture of rachis and petiole), apiculate from the lower side apically; pinnae 1-4 cm. long; leaflets linear or linear-oblong, 2-8 mm. long and mostly 1-2 mm. wide, obtuse or rounded apically, obliquely truncate basally, glabrous except usually ciliate, the costa but not secondary veins visible; stipules setiform, mostly 3-5 mm. long. Inflorescence of axillary, pedunculate heads towards the tips of the twigs; peduncles up to 6 cm. long (in age), usually scatteringly pubescent; head small, dense, few-flowered, the flowers all erect; floral bractlets lanceolate, about 2 mm. long, subrigid. Flowers whitish, sessile; calyx cupular-tubular, 2-3 mm. long, glabrous or subglabrous, prominently dentate; corolla of 5 essentially free, obovate, glabrous petals 3-4 mm. long; stamens 10, free, glabrous, the filaments 6-7 mm. long; anthers ovate, almost 1 mm. long, glabrous; ovary linear-oblong, about 3 mm. long, curved, glabrous, bilateral; style about 5 mm. long, expanded apically into a truncate stigma. Legume linear, mostly 4-6 cm. long and 3-4 mm. wide, flat, glabrous, short-beaked, dehiscent on both valves, the seeds oblique.

Florida and Texas to Argentina; West Indies; Galapagos; probably introduced elsewhere.

CANAL ZONE: Balboa, *Standley* 27137, 32146. COCLÉ: Aguadulce, *Pittier* 4970. PANAMÁ: Matías Hernández, *Pittier* 6906; Las Sabanas, *Standley* 30693; Bro. Paul 598.

A fairly common but inconspicuous weedy plant in Central America, generally flowering during the rainy season.

Standley and Steyermark, following Fawcett and Rendle, have recently recognized the synonymy of *D. depressus* and *D. virgatus*. My observations similarly indicate that no reasonably distinct boundary exists between these two species. Perhaps *D. depressus* could be profitably reduced to varietal status under *D. virgatus*, for the name well reflects a tendency within the species-complex towards more diffuse habit, smaller (fewer pinnae) leaves, and less prominent rachial gland. However, I cannot say into which category Panamanian specimens would likely fall.

11. LEUCAENA Benth.

LEUCAENA Benth. in Hook. Jour. Bot. 4:416. 1842.

Ryncholeucaena Britt. & Rose, in N. Am. Fl. 23:130. 1928.

Caudoleucaena Britt. & Rose, loc. cit. 1928.

Unarmed shrubs or trees, glabrous or pubescent. Leaves bipinnate, the pinnae few or several pairs opposite on the rachis, the leaflets few and large or many and small; petiole evident, usually glandular; rachis pronounced, glandular or eglandular; pinnular rachis often gland-bearing; leaflets linear to ovate, pubescent or glabrous, usually dull. Inflorescence of axillary or racemose pedunculate heads; peduncles usually stout, solitary or fasciculate, ebracteate except at the base of the head; head globular, dense, the floral bractlets evident, usually peltate. Flowers valvate, white; calyx subcampanulate, markedly sympetalous but 5-toothed, usually pubescent apically; corolla of 5 narrow, essentially free petals; stamens 10, free, exserted, the anthers relatively large, pubescent or glabrous; ovary stipitate, glabrous or pubescent, inequilateral (bilaterally symmetrical), multiovulate; style thicker than the filaments, gradually expanded into an obliquely truncate stigma. Legume linear to oblong, straight, flat, thin, dehiscent from both margins, the seeds usually nearly transverse.

Chiefly New World tropics and subtropics; a few species described from the Far East, and some introduced into various parts of the world.

This comparatively small genus, a well recognized segregate of *Acacia*, superficially resembles *Albizzia*. The flowers, however are very different from those of *Albizzia*, and afford the diagnostic criteria for the genus. Only two species are known from Panama.

- a. Leaflets small, sublinear, 8-15 mm. long, about 15 pairs per pinna..... 1. *L. GLAUCA*
- aa. Leaflets larger, nearly ovate, 15-40 mm. long, about 4 pairs per pinna..... 2. *L. MULTICAPITULA*

1. *LEUCAENA GLAUCA* (L.) Benth. in Hook. Jour. Bot. 4:416. 1842.*Mimosa glauca* L. Sp. Pl. 520. 1753.*Mimosa leucocephala* Lam. Encycl. Meth. 1:12. 1783.*Acacia glauca* Willd. Sp. Pl. 4:1075. 1806.*Acacia leucocephala* Link, Enum. 2:444. 1822.

Shrub or tree, the branchlets tomentulose becoming less pubescent in age, moderately lenticellate. Leaves large, bipinnate, the pinnae 5-10 pairs opposite on the rachis, the leaflets about 15 pairs per pinna; petioles mostly 3-4 cm. long, puberulent, sulcate or flattened above, usually bearing a sessile, conic gland apically just below insertion of the basal pair of pinnae, but this frequently absent; rachis up to 15 cm. long or longer, similar to the petiole, eglandulose. Pinnae up to 10 or 12 cm. long, the pinnular rachis bearing a small, patelliform gland apically at insertion of the terminal pair of leaflets; leaflets linear-elliptic, 8-15 mm. long and 2-3 mm. wide, inequilaterally acute or subobtuse basally, acute apically, subglabrous, dull, usually ciliate-margined, the costa (and perhaps 1-2 smaller basal veins) prominent, the secondary venation obscure; stipules small, ovate, pubescent. Inflorescence of large, pedunculate heads, 1-3 axillary from subterminal nodes; peduncles about 4 cm. long in age, stout, tomentulose; heads orbicular, dense, almost 2 cm. in diameter, the receptacle expanded. Flowers white; calyx tubular-campanulate, 1-3 mm. long, quite briefly dentate, pubescent apically; corolla of 5 free petals, these linear-spatulate, about 5 mm. long, puberulent without; stamens 10, 7-8 mm. long, glabrous, the anthers ovate-oblong, about 1 mm. long; ovary inequilateral, pubescent apically, many-ovulate; style thick, expanding gradually into a broad, obliquely truncate stigma. Legume linear, about 15 cm. long and nearly 2 cm. wide, minutely puberulent, stipitate, briefly apiculate, flat and thin, dehiscent on both margins, the seeds somewhat obliquely transverse.

Tropical America; introduced into various parts of the world.

CANAL ZONE: Balboa, Allen 2756; Standley 30912.

The species is frequently cultivated. Standley reports a widespread popular belief in Central America that consumption of this species by horses, mules, and pigs will lead to loss of their hair.

2. *LEUCAENA multicapitula* Schery, sp. nov.

Arbor vel frutex ramis teretibus primo tomentulosis denique subglabris; foliis magnis distichis bipinnatis, pinnis plerumque 6 vel 8, foliolis 6-10, petiolis 2-3 cm. longis tomentulosis subglabrisve 1-glanduliferis, rhachibus ca. 6 cm. longis, eglanduliferis, foliolis ovatis vel ellipticis, 15-50 mm. longis, 7-25 mm. latis, basi inequilateraliter late acutis apice plerumque acutis, supra leviter puberulentis subter dense canescenti-puberulentis; inflorescentia 3-composita, capitulis ultimis pedunculatis fasciculatis, pedunculis tomentosis bracteatis solum subtus capitulos, capitulis orbicularibus ad 1 cm. diametro crebris, bracteis peltatis; floribus parvis albis sessilibus; calyce infundibuliformi-campanulato ca. 1 mm. longo; petalis 5 lineari-oblongis ca. 2 mm. longis glabris; staminibus 10, liberis 3-4 mm. longis glabris,

Fig. 102. *Leucaena multicapitula*

antheris magnis pubescentibus glabrisve, ovario inaequilaterali glabro brevistipitato, stigmate oblique truncato; legumine late lineari ca. 12 cm. longo et 3 cm. lato tenui glabro.

Unarmed tree or shrub, the branchlets tomentulose when young becoming subglabrous, moderately lenticellate, terete. Leaves 2-ranked, large, bipinnate, the pinnae normally 3-4 pairs opposite on the rachis, the leaflets 3-5 (mostly 4) pairs per pinna; petiole about 2-3 cm. long, terete, tomentulose, becoming subglabrous, bearing a sessile, conic gland slightly below insertion of the lower pair of pinnae; rachis about 6 cm. long, similar to the petiole, eglandular or with a solitary gland at insertion of terminal pinnae; pinnular rachis 2-8 cm. long, puberulent or subglabrous, bearing a conic gland apically just below insertion of the terminal pair

of leaflets; leaflets ovate or elliptic, 15–50 mm. long and 7–25 mm. wide, broadly and somewhat inequilaterally acute basally, acute apically (occasionally rounded on same leaf), dull, densely canescent-puberulent below (at least in young leaflets) and to a lesser extent above, lighter below than above; stipules caducous. Inflorescence thrice compound, consisting of several terminal and subterminal racemes of few-fasciculate pedunculate heads; peduncles about 1 cm. long, tomentose, ebracteate except just below the head; head orbicular, less than 1 cm. in diameter, dense, beset (in bud) with pubescent, peltate bracts. Flowers whitish, sessile, small; calyx funnelform-campanulate, little more than 1 mm. long, puberulent on the teeth, the 5 teeth about as broad as long; corolla of 5 linear-oblong or linear-spatulate petals, these about 2 mm. long, glabrous; stamens 10, free, 3–4 mm. long, glabrous, the anthers ovate, somewhat less than 1 mm. long, pubescent or glabrous; ovary inequilateral, glabrous, short-stipitate, the style stout, the stigma obliquely truncate. Legume broadly linear, about 12 cm. long and almost 3 cm. wide, flat and thin, glabrous.

Panama.

CANAL ZONE: Barro Colorado Island, *Bailey & Bailey 281*; Miraflores, *P. White 135* (Gray Herb., TYPE); *G. White 165* (Gray Herb., COTYPE). DARIÉN: Rio Chico, *Allen 4642*, 5088.

It is not clear just how closely this species is related to other South American species such as *L. canescens* Benth. and *L. trichodes* (Jacq.) Benth. or to a number of similar or little-known northern Central American and Mexican species described by Britton and Rose and others, many of them doubtfully tenable. It has been impossible, however, to find anything matching the cited specimens in the larger herbaria of the United States. The Darién specimens are somewhat different from the Canal Zone specimens, but it is not deemed wise to consider them yet another species. The species is particularly distinguished by the inflorescence, which forms a thrice-branched terminal panicle of heads. No other species of the genus possesses this very branched inflorescence, and in some cases the pedunculate heads are merely axillary. Nor is the dense but fine pubescence of the lower leaf surface in *L. multicapitula* similar to that of any other species of which I have been able to examine specimens. Most species have glabrous leaves or a looser, longer pubescence.

12. PROSOPIS L.

PROSOPIS L. Mantissa, 10. 1767.

Mitostax Raf. Sylva Tell. 120. 1838, fide Dalla Torre & Harms.

Neltuma Raf. loc. cit. 119. 1838.

Pleuromenes Raf. loc. cit. 144. 1838, fide Dalla Torre & Harms.

Spirolobium Orbigny, Voy. Amer. Merid. 7, p. 1, Sert. Patagon., t. 13. 1839, fide Dalla Torre & Harms.

Algarobia Benth. Pl. Hartweg. 13. 1839.

Strombocarpa Engelm. & Gray, in Bost. Jour. Nat. Hist. 5:243. 1845.

Sopropis Britt. & Rose, in N. Am. Fl. 23:182. 1923.

Trees or shrubs, armed or rarely unarmed. Leaves bipinnate, the pinnae 1 to several pairs, opposite, the leaflets few or many pairs per pinna; petiole prominent, usually glandular; rachis present or obsolete; leaflets generally small, glabrous or less frequently pubescent; stipules small, caducous, modified as spines, or in some species apparently lacking. Inflorescence of axillary, pedunculate heads, spikes, or even racemes. Flowers small, 5-parted, sessile or substipitate, yellowish or whitish; calyx synsepalous, usually shallowly and distantly dentate; petals free or connate near the middle; glabrous or pilose within; stamens normally 10, free, exserted; anthers comparatively large, bearing terminally a small or moderate, often caducous gland; ovary pubescent or glabrous, the style stout, the stigma small. Legume very variable, linear to spiral, flat or turgid, indehiscent, with a pulpy mesocarp, the endocarp septate or not septate.

Chiefly New World from United States to Patagonia; a few species are Asiatic or African.

A polymorphic genus, very variable and difficult to delimit precisely, containing many intergrading and difficultly distinguishable species. The genus exhibits a wide range of legume forms, which ordinarily in the MIMOSOIDEAE would be occasion for generic segregation. Strangely there has been a minimum of such segregation by responsible taxonomists, and some of the segregates (as *Strombocarpa*, here included among the synonyms) appear to merit generic consideration. Within *Prosopis* in the broad sense are found characteristics prominent among a number of different genera: hence it is not surprising to find species now accepted as *Prosopis* having been described or included in *Mimosa*, *Acacia*, *Desmanthus*, etc.

Neither the limits of the genus nor of most of the species have been accurately defined. Benthams (Trans. Linn. Soc. 30:376-388) listed 16 species in 4 sections. Burkart (Darwiniana 4:57-128) recognizes 33 species and an additional 2 sections. Britton and Rose (N. Am. Fl. 23:184-187) list 14 species (in segregate genus *Neltuma*) as occurring north of South America, but it is generally conceded that few of these are tenable. Recent opinion indicates that but a single species occurs in Panama and all Central America.

1. *PROSOPIS JULIFLORA* (Sw.) DC. Prodr. 2:447. 1825.

Mimosa juliflora Sw. Prodr. Veg. Ind. Occ. 85. 1788.

Mimosa piliflora Sw. Fl. Ind. Occid. 2:986. 1800, fide Burkart.

Acacia juliflora Willd. Sp. Pl. 4:1076. 1806.

Neltuma juliflora Raf. Sylva Tell. 119. 1838.

Algarobia juliflora Benth. ex Heynhold, Nom. Bot. Hort. 2:18. 1840, fide Britt. & Rose.

Neltuma Bakeri Britt. & Rose, in N. Am. Fl. 23:185. 1928.

Benthams lists 29 additional synonyms for this species (Trans. Linn. Soc. 30:377. 1875), including (under a diversity of the generic names above given) the following specific epithets: *affinis*, *bracteolata*, *cumana*, *cumanensis*, *dihetera*, *domingensis*, *duicis*, *flexuosa*, *fruticosa*, *juncata*, *glandulosa*, *borrida*, *inermis*, *laevigata*, *odorata*, *pallida*, *salinarum*, *siliquastrum*.

Small shrub to moderate tree, the branchlets terete, glabrous, flexuous, obscurely lenticellate, usually armed at the "nodes" with prominent paired spines up

to a few cm. long. Leaves arising from very condensed short-shoots, moderate or moderately large, bipinnate, the pinnae mostly 1-2 pairs, opposite, the leaflets few to many pairs per pinna; petiole prominent, most frequently 2-5 cm. long, terete but flattened above, normally bearing a small, sessile, subconic gland apically above; rachis shorter than the petiole or obsolete, glabrous, apiculate terminally from below; pinnae 3-10 cm. long, the rachis glandular at the distal 1 to few rachial nodes; leaflets linear to oblong, 5-20 mm. long and 1-5 mm. wide, usually rounded or obtuse apically and basally, scarcely inequilateral, dull, glabrous or subglabrous, the venation remote and moderately prominent below; stipules linear, subsetiform. Inflorescence a slender, elongate, briefly pedunculate, axillary spike inserted on the short-shoots; peduncles mostly 1-2 cm. long, often sparsely pubescent and minutely bracteate above the middle; spike commonly about 6 cm. long, rather densely flowered, the floral bracts minute. Flowers sessile, whitish; calyx cupular, about 1 mm. long, glabrous or pubescent, the 5 teeth narrow and remote; petals 5, sublinear, 2-3 mm. long, free (at least in age), pilose within especially distally; stamens normally 10, up to 6 mm. long, free, glabrous; anthers ovate, less than 1 mm. long, gland-tipped (gland often caducous); ovary pubescent; style stout, exceeding the stamens. Legume linear or linear-subtorulose, not uncommonly 20 or more cm. long and 8 mm. wide or wider, flattened or turgid, pulpy, indehiscent.

In a broad sense United States to Argentina; in narrow sense West Indies, Venezuela, and Colombia.

PANAMÁ: Bella Vista, Standley 25391; Maxon & Valentine 6958; Panama Vieja, Allen 824. DARIÉN: La Palma, Pittier 6616.

This species is said to be the only one of the genus in Central America. Specific delimitation is exceedingly uncertain, and this difficulty is reflected in the unusually large number of synonyms which have accumulated. Certainly tremendous variability in vegetative and legume characters is readily discernible in any folder of "*Prosopis juliflora*" in any herbarium collection. Benthams could find no defining characters within the complex, and hence regarded the species very broadly. More recently Burkart (Darwiniana 4:105. 1940) has concluded that delimitation in the past has been excessively broad, and regards the species in a much stricter sense. However, Standley and Steyermark, with wide experience in the flora of the Americas, question (Fieldiana: Bot. 24:87. 1946) whether *P. juliflora* can even be separated from the older *P. chilensis* (Molina) Stuntz of southern South America. Certainly herbarium sheets labeled *P. chilensis* seem, at least upon superficial examination, to fall within the limits of variability exhibited by sheets labeled *P. juliflora*.

The species, whatever may eventually prove to be its correct name and specific boundaries, is a locally important plant of xerophytic and subxerophytic regions. In Central America it seems confined to thickets on the Pacific slopes where a marked dry season is usually to be had. It there may reach proportions of a small tree. In its broad sense it is better known, however, as the *mesquite* of northern Mexico and the southwestern United States, where it is usually of smaller propor-

tions. A great many common names are had for the species, among which are found *cashaw* and *algarroba*. The stem and roots provide wood for fuel, or occasionally for fence-posts, cross-ties, etc. The wood is reported to finish well, and to be resistant to decay. The pods are pulpy, and the pulp after drying and grinding forms an edible meal said to be consumed by Mexican Indians. The pods are excellent for feeding stock. In addition, the plant reportedly provides excellent honey-flowers, a tannin from the bark, and a gum from the trunk.

13. STRYPHNODENDRON Mart.

The genus *Stryphnodendron* Mart. (Flora 20:Beibl. 2:117. 1837) is known both from Costa Rica and Colombia, and well may occur in Panama although no record from there has as yet become known. The genus consists of unarmed trees, with large, bipinnate leaves and mostly alternate leaflets. The inflorescence is of axillary spikes, the flowers having 10 stamens and gland-tipped anthers. It is similar to *Prosopis* in having an indehiscent legume.

14. PIPTADENIA Benth.

PIPTADENIA Benth. in Hook. Jour. Bot. 4:334. 1842.

Stachydrum Boj. Hort. Maurit. 114. 1837, fide Ind. Kew.

Goldmania Rose ex Micheli, in Mem. Soc. Bot. Genève 34:274. 1903, fide Britt. & Rose.

Niopa Britt. & Rose, in Addisonia 12:37. 1927.

Pityrocarpa Britt. & Rose, in N. Am. Fl. 23:190. 1928.

Shrubs or trees, erect or sometimes decumbent, the branchlets pubescent or glabrous, acuminate or unarmed. Leaves usually large, bipinnate, the pinnae usually several, multifoliate, both the pinnae and leaflets usually opposite; petiole normally bearing one or more sessile glands; rachis glandular or eglandular at the pinnular nodes; leaflets almost invariably small; stipules usually slender, caducous. Inflorescence of solitary or few-fasciculate, pedunculate heads or spikes, sometimes appearing paniculate by insertion at distal non-foliate nodes; floral bracts small or minute. Flowers 5-parted, sessile or subsessile; calyx more or less campanulate, the teeth commonly small, glabrous or pubescent; corolla of 5 free (or often connate to middle), narrow petals well exceeding the calyx, valvate; stamens normally 10, free except often inserted on a short tubular base or androgynophore, exerted; anthers in all except one or two species (not Panamanian) bearing an apical gland, this usually caducous in age; ovary glabrous or pubescent, often stipitate. Legume broadly linear, flat, not curved, stipitate or sessile, membranaceous or coriaceous, 2-valvate, the valve margins straight or constricted between the seeds; seeds compressed, exalbuminous.

New World tropics and subtropics; Asia and Africa.

A moderate-sized genus, abundant in middle and northern South America. It is not particularly "natural" or clear-cut, and except for the confusion that would result there might be justification in recognition of certain segregates (viz. *Niopa*).

Certain species of *Piptadenia*, at least superficially, much resemble other genera such as *Leucaena*, *Acacia*, and *Mimosa*. It thus frequently becomes difficult to identify accurately poor or incomplete specimens. The bark of some species is said to be quite astringent, and the seeds are reported highly narcotic. A single species has so far been reported from Panama.

1. *PIPTADENIA FLAVA* (Spreng.) Benth. in Trans. Linn. Soc. 30:371. 1875.

Acacia flava Spreng. ex DC. Prodr. 2:469. 1825.

Piptadenia suaveolens Griseb. Fl. Brit. W. Ind. 710. 1864; nom. nudum, not Miq.

Piptadenia leptocarpha Rose, in Contr. U. S. Nat. Herb. 1:325. 1895.

Mimosa buceragenia B. L. Robins., in Proc. Am. Acad. 43:23. 1907, fide Britt. & Rose.

Erect to procumbent small tree or shrub, the branchlets glabrous or sparsely puberulent, inconspicuously lenticellate, often longitudinally striate or ridged, usually sparsely armed with rather small, scattered, recurved thorns. Leaves large, bipinnate, the pinnae 6–11 pairs, more or less opposite, the leaflets many (frequently 25 or more) pairs per pinna; petiole 1–4 cm. long, subterete, sulcate above, glabrous or pubescent, bearing a shallow, oblong, cupulate gland usually near the middle; rachis up to 25 cm. long, usually puberulent above, eglandular except sometimes bearing a cupulate gland at insertion of terminal pair of pinnae; pinnular rachis up to 8 cm. long, usually bearing a small gland at insertions of distal 1–2 pairs of leaflets, pubescent, subulate; leaflets linear, 4–8 mm. long and 1–2 mm. wide, broadly acute apically, asymmetrically rounded or truncate basally, glabrous, the costa excentric baseward, the secondary venation remote, ascending; stipules linear-setiform, as much as 6 mm. long. Inflorescence of elongate, pedunculate, axillary spikes, these solitary or few-fasciculate, near the tips of twigs arising from nodes not yet foliate and hence appearing somewhat paniculate; peduncles usually less than 1 cm. long, subtomentose; spike commonly about 6–7 cm. long, the axis pubescent, the flowers moderately dense, the floral bracts minute. Flowers sessile, reported yellow; calyx cupulate, about 1 mm. long, 5-lobed, glabrous; corolla of 5, free, nearly linear petals about 3 mm. long, glabrous; stamens normally 10, free, inserted atop a short tube or androgynophore, 5–6 mm. long; anthers broadly oblong, almost 1 mm. long, bearing an apical gland, glabrous; ovary glabrous, conspicuously stipitate, apparently abortive in some flowers; stigma narrow. Legume broadly linear, 5–9 cm. long and about 15 mm. wide, thin, glabrous, glandular when young, the surface irregular because of maturing seeds but not constricted between the seeds.

Mexico to northern and western South America.

COCLÉ: Aguadulce, Pittier 4890.

Vegetatively (or even in fruit) *P. flava* resembles species of *Leucaena* and *Acacia*. The elongate spike, however, tends to distinguish it from similar species of these other genera in Panama. *P. viridiflora* and/or *P. communis* may with comprehensive study prove to be synonyms of this species.

15. ENTADA Adans.

ENTADA Adans. Fam. Pl. 2:318. 1763, nom. conserv.

Gigalobium P. Br. Nat. Hist. Jamaica, 362. 1756.

Perima Raf. Sylva Tellur. 118. 1838.

Strepsilobus Raf. loc. cit. 117. 1838.

Adenopodia Presl, Epim. Bot. 206. 1850, fide Hook. Jour. Bot. 4:286. 1852.

Pusaetba [L. 1747] Ktze. Rev. Gen. Pl. 1:204. 1891.

Entadopsis Britt., in N. Am. Fl. 23:191. 1928.

Pseudoentada Britt. & Rose, loc. cit. 1928.

Woody vines or climbing shrubs or trees, usually very large, unarmed (in Panama) or aculeate, sometimes cirriferous. Leaves large, bipinnate, the pinnae few pairs (in Panama) or less frequently several to many, opposite, the leaflets few to many pairs; petiole and usually the rachis eglandular, the rachis sometimes terminating in a bifurcate tendril; leaflets large or small; stipules small. Inflorescence of usually elongate spikes, these solitary and borne from foliate branches or clustered terminally in a large raceme; floral bracts minute. Flowers small, usually briefly stipitate, 5-parted, valvate, variously colored, often with a disagreeable odor; calyx small, synsepalous, broadly and shallowly cupulate; corolla of 5 free or slightly coherent petals; stamens 10, free, briefly exserted; anthers tipped with a (caducous) gland; ovary several- to many-ovulate; style slender; stigma terminal, truncate. Legume often very large (Panamanian species), flat, straight or curved, the valves in time breaking into segments, the margins continuous and persistent.

At least one species pantropical; others chiefly African and tropical American.

A comparatively small genus of less than 20 species, many of which are dissimilar to the others and a cause for past generic segregation. It seems scarcely advisable, however, to accept division of *Entada* into several smaller genera based on these differing species, for such a procedure, if followed generally here and in the MIMOSOIDEAE as a whole, could continue *ad infinitum* until practically no "genus" could be readily located. The Panamanian species of *Entada* suggest, at least superficially, giant liana-type Mimosas, but can be readily distinguished by the long spikes of flowers which are not found in any of the Panamanian species of *Mimosa*. The leaves are sometimes reported sensitive, folding following disturbance, such as is the case with a number of *Mimosa* species. Two species of *Entada* are known to occur in Panama, both distinctive vines of lowland areas.

- a. Inflorescence a supra-axillary spike; leaves often cirriferous; legume very large, the seed 3-5 cm. in diameter..... 1. *E. GIGAS*
- aa. Inflorescence a terminal raceme of spikes; leaves seldom with tendrils; legume smaller, the seeds only about 1 cm. long..... 2. *E. POLYSTACHYA*

1. ENTADA GIGAS (L.) Fawc. & Rendle, Fl. Jamaica 4:124. 1920.

Mimosa gigas L. Fl. Jam. 22. 1759.

Entada gigalobium DC. Prodr. 2:424. 1825.

Large vine of lowland areas, often climbing to the tops of forest trees, the branchlets essentially glabrous and inconspicuously lenticellate. Leaves very large, bipinnate, commonly cirriferous, the pinnae usually 2 pairs, opposite, the leaflets

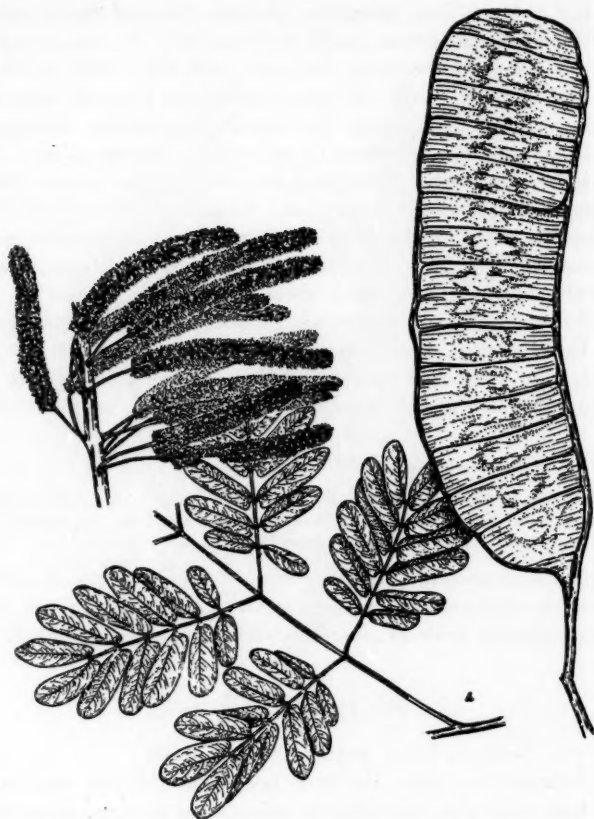
3-6 pairs per pinna; petiole usually 2-4 cm. long, eglandular, frequently puberulent, callous basally; rachis similar to the petiole, up to 20 cm. long, eglandular, commonly terminating in a stout, branched tendril, especially on new growth; pinnae up to 15 cm. long, the axis similar to the rachis; leaflets asymmetrically oblong, the terminal ones as much as 8 cm. long and 3 cm. wide, the basal ones as small as 1.5 cm. wide and 1 cm. broad, usually blunt or even emarginate apically, inequilaterally obtuse basally, glabrous except on the costa, somewhat glossy above, dull below, the venation conspicuous, the secondary lateral veins essentially parallel; stipules linear, about 4 mm. long. Inflorescence an elongate spike, supra-axillary (usually inserted 5-10 mm. above the axil), the peduncular portion only 1-5 cm. long, the floriferous portion 7-25 cm. long, the floriferous bractlets squamiform. Flowers crean, odorous (often described as unpleasantly so, or with a "sickly odor"), short-stipitate; calyx shallowly cupulate, about 1 mm. deep, rather irregularly 5-lobed, glabrous; corolla of 5 narrowly elliptic petals about 3 mm. long, glabrous, free or somewhat connate basally; stamens 10, 6-7 mm. long, the anthers usually bearing a (caducous) gland; ovary glabrous. Legume very large, as much as 2 m. long (commonly several dm. long) and about 1 dm. broad, more or less oblong, curved, flat, transversely jointed but the margins continuous, glabrous, the segments 1-seeded; seeds orbicular, 3-5 cm. in diameter, flattened, blackish, glossy.

Central America, northern South America, and West Indies; west Africa.

BOCAS DEL TORO: Bocas del Toro, *Read s. n.* CANAL ZONE: Barro Colorado Island, *Standley 31264; Stevens 416*. PANAMÁ: San José Island, *Erlanson 15, 82; Johnston 600, 983*.

A tendriled vine, very remarkable for the enormous size of the legume, probably not equalled by that of any other species of the family in this hemisphere. It is the so-called "sea-bean," the shiny black seeds of which are carried long distances by ocean currents. The species is a lowland plant, frequently found near the sea-shore, and its wide distribution can perhaps be explained by discharge of the seeds into the ocean.

Dr. I. M. Johnston (mss.), who studied "sea-beans" intensively during the war years, shows that on the basis of the fruit *E. gigas* is quite distinct from the Old World *E. phaseoloides* (?*Mimosa Entada* L. Sp. Pl. 518. 1753, fide Merrill; *Lens phaseoloides* L. in Stickman, Herb. Amboin. 18. 1754; *Mimosa scandens* L. Sp. Pl. ed. 2, 1501. 1763; *Adenanthera scandens* (L.) Forster, Fl. Ins. Aust. Prodr. 33. 1786; *Acacia scandens* (L.) Willd. Sp. Pl. 4:1057. 1806; *Entada Pursaetha*, *E. monostachya*, and *E. Adenanthera* DC. Prodr. 2:424. 1825, fide Benth.; *E. Rheedii* and *E. Parrana* Spreng. Syst. 2:325. 1825; *Strepsilobus scandens* (L.) Raf. Sylva Tell. 118. 1838; *Entada scandens* (L.) Benth. in Hook. Jour. Bot. 4:332. 1841; *E. Gandu* Hoffm. ex Walp. Rep. 1:858. 1842, fide Benth.; *E. Rumbpii* Scheff. in Natuurk. Tijdschr. Ned. Ind. 32:90. 1872, fide Benth.; *Gigalobium scandens* (L.) Hitchcock, in Rept. Mo. Bot. Gard. 4:82. 1893), a name heretofore applied to a group of similar species and including the American *E. gigas*.

Fig. 103. *Entada polystachya*2. *ENTADA POLYSTACHYA* (L.) DC. Mem. Legum. 434. 1825.*Mimosa polystachya* L. Sp. Pl. 520. 1753.*Mimosa bipinnata* Aubl. Pl. Guian. 2:946. 1775.*Mimosa caudata* Vahl, Eclog. 3:35. 1807, fide Benth.*Mimosa chilantha* G. F. W. Mey. Prim. Fl. Esseq. 163. 1818, fide Benth.*Adenanthera Bonplandiana* Kunth. in HBK. Nov. Gen. & Sp. 6:311. 1824.*Acacia caudata* DC. Prodr. 2:456. 1825.*Entada Plumieri* Spreng. Syst. 4²:164. 1827.*Entadopsis polystachya* Britt. in N. Am. Fl. 23:191. 1928.

Large, woody liana up to 15 or more m. tall, the branchlets glabrous, longitudinally striate, the old stems rather shaggy-barked. Leaves large, bipinnate, the pinnae commonly about 4 pair, opposite, the leaflets mostly 5-8 pairs per pinna;

petiole mostly 4-8 cm. long, eglandular, glabrous, flattened above; rachis similar to the petiole, eglandular; pinnae usually 6-15 cm. long, the axis often puberulent above; leaflets oblong, 15-40 mm. long and 5-18 mm. wide, usually rounded apically and obliquely so basally, glabrous or sometimes sparingly pubescent below or along the margins, glossy above, the venation prominently reticulate; stipules linear, small, caducous. Inflorescence a large, terminal raceme (often 2 dm. long) of slender spikes, the latter 6-7 cm. long, inserted singly or in pairs; floral bractlets not apparent; axis usually puberulent. Flowers small, very briefly stipitate, reported reddish, pinkish, whitish or greenish, with a disagreeable odor; calyx shallowly cupulate, scarcely 1 mm. deep, briefly dentate, glabrous; corolla of 5, free, narrowly oblong, glabrous petals about 2 mm. long; stamens 10, somewhat exceeding the petals, glabrous, the anthers (at least in youth) gland-tipped; ovary glabrous. Legume large, oblong, commonly 25-30 cm. long and 6 or 7 cm. wide, curved, flat, thin, glabrous, lustrous, the valves in time breaking into segments, the margins persistent; seeds comparatively small, oblong, no more than 1 cm. long.

Mexico to middle South America; West Indies.

BOCAS DEL TORO: Chiriquí Lagoon, *H. von Wedel* 1062, 1214, 2495, 2743. CANAL ZONE: Frijoles, *Bro. Heriberto* 113; Miraflores Lake, *P. White* 256. HERRERA: Pese, *Allen* 804. PANAMÁ: R. La Maestra, *Allen* 34; Juan Díaz, *Standley* 30518.

The species is an interesting tall vine of the lowland areas, with a large, terminal, disagreeably odoriferous inflorescence and large, persistent legumes. Macerated root or stem reportedly produces a soap-like lather with water, suitable for washing.

16. PENTACLETHRA Benth.

PENTACLETHRA Benth. in Hook. Jour. Bot. 2:127. 1840.

Trees, the branchlets coarse, the leaves few-ranked. Leaves very large, bipinnate, the pinnae many pairs, opposite, the leaflets many pairs per pinna; petiole and rachis eglandular; leaflets small, numerous, inequilateral or falcate; stipules small. Inflorescence of stout, elongate spikes, apparently ebracteate. Flowers moderately small, 5-parted, rather coriaceous; calyx cupulate, the rounded lobes somewhat imbricate in bud; corolla of 5 petals connate below the middle, valvate; stamens 5, exserted, united below (with staminodia) into a very short tube; staminodia 5 (in Panama), 10 or 15, usually about 3 times as long as the stamens; anthers relatively large, gland-tipped; ovary subsessile, the stigma expanded, terminal. Legume large, flat, thick, woody, broadest above the middle, elastically 2-valvate, longitudinally striate.

Tropical America; Africa.

The genus consists of a single New World and one or two African species. It is allied to *Parkia* (South American and Old World), but the latter has a short or subcapitate inflorescence and 10 fertile stamens.

Fig. 104. *Pentaclethra macroloba*1. *PENTACLETHRA MACROLOBA* (Willd.) Ktze. Rev. Gen. Pl. 1:201. 1891.*Acacia macroloba* Willd. Sp. Pl. 4:1060. 1806.*Mimosa macroloba* Poir. in Lam. Encycl. Meth. Suppl. 1:66. 1810.*Acacia aspidioides* G. F. W. Mey. Prim. Fl. Esseq. 165. 1818, fide Benth.*Pentaclethra filamentosa* Benth. in Hook. Jour. Bot. 2:127. 1840.*Pentaclethra brevipila* Benth. loc. cit. 128. 1840, fide Benth.*Caillea macrostachya* Steud. in Flora 26:759. 1843.*Entada Wrbeana* Presl, Epim. Bot. 206. 1850, ex char. fide Benth.

Unarmed tree, the branchlets stout, longitudinally striate, puberulent when young, callous in age. Leaves very large, bipinnate, the pinnae many (usually 15-20) pairs, opposite, the leaflets many pairs per pinna; petiole 1-5 cm. long, eglandular, terete except shallowly sulcate above, callous basally; rachis as much as 3 dm. long, pubescent above, eglandular; pinnae 2-10 cm. long, eglandular;

leaflets small, linear-subfalcate, mostly 6-9 mm. long and 1-2 mm. wide, sharply acute-acuminate apically, obliquely rounded or truncate and more or less auriculate on the proximal side basally, essentially glabrous, darker and lustrous above, the venation fairly prominent below; stipules small, linear. Inflorescence of few or several terminal and subterminal, elongate spikes; peduncular portion of spike 1-5 cm. long, pubescent; floriferous portion usually 15 or more cm. long at maturity, pubescent, ebracteate. Flowers dense, sessile, 5-parted, white; calyx cupulate, 1-2 mm. long, the broad, rounded lobes shorter than the tube and somewhat imbricate in bud; petals linear-elliptic, about 5 mm. long, usually coherent for about the lower third or half of their length, glabrous, valvate; stamens 5, 6-7 mm. long, alternating with 5 thin, elongate staminodia about 2 cm. long, stamens and staminodia briefly united at the base; anthers about 1 mm. long, bearing a prominent apical gland or appendage; ovary subsessile, pubescent; style slightly exceeding the stamens; stigma expanded. Legume linear-subspatulate, 2-3 dm. long and up to 4 cm. wide, flattened but thick, ligneous, narrowed baseward, lustrous, glabrous, longitudinally striate, 2-valvate, the valves coiling backwards after dehiscence.

Southern Central America, West Indies, north-central South America.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater 126*; Guabito, *Skutch 11*.
DARIÉN: El Real, *Pittier 6700*; Pinogana, *Allen 935*.

A species quite different from other MIMOSOIDEAE in Panama, apparently confined to the lowlands. The large spikes of white flowers and the unusual legume make *P. macroloba* quite striking.

(*Leguminosae to be concluded in Part V, Fasc. 3*)

